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FUNDAMENTAL PATHOLOGY OF THE LARYNX.*†

DR. JOHN D. KERNAN, New York.

It must be said in the first place that the really basic pathology of the larynx, or of any tissue, is not known, because we do not as yet understand the subtle biological influences controlling cell activity. The best we can do at present is to base our studies of pathology on the histological appearance of the tissue being examined. In doing this we are really dealing with effects and not causes.

Pathology in the larynx is, of course, modified by the peculiar structure of the larynx, highly mobile muscular tissue confined within a strong immovable cartilaginous wall. When only the epithelium and the submucosa are involved, the process may be comparatively simple; once the underlying fibrous and muscular tissue are attacked by the disease process, appearances may be greatly changed. This is still more so if the perichondrium and cartilage are involved in the disease.

Now, as to inflammations, I will deal with them very briefly. A catarrhal inflammation is the same whether appearing in the nose or in the larynx. A peculiarity of inflammation about the larynx which must not be forgotten is the

*Read before the New York Academy of Medicine, Section on Otology, Nov. 18, 1936.

†This paper was originally presented with lantern slides illustrating the various cases and types. In arranging the article for publication, it has been necessary to eliminate some of the slide illustrations. In order to include the text relating to all of the cases, a double enumeration has been used, the figure numbers designating the photomicrographs reproduced in this article, and the slide numbers referring to the cases and text as indicated in the original presentation.

great liability to edema. This is due to the presence of a good deal of loosely formed tissue, especially in the arytenoepiglottic fold and in the subglottic space. Edema affects the larynx, not only when that organ is itself inflamed, but also when there is inflammation in the neighboring structures of the neck. This edema manifests itself clinically in acute laryngeal dyspnea so frequently seen, especially in children when

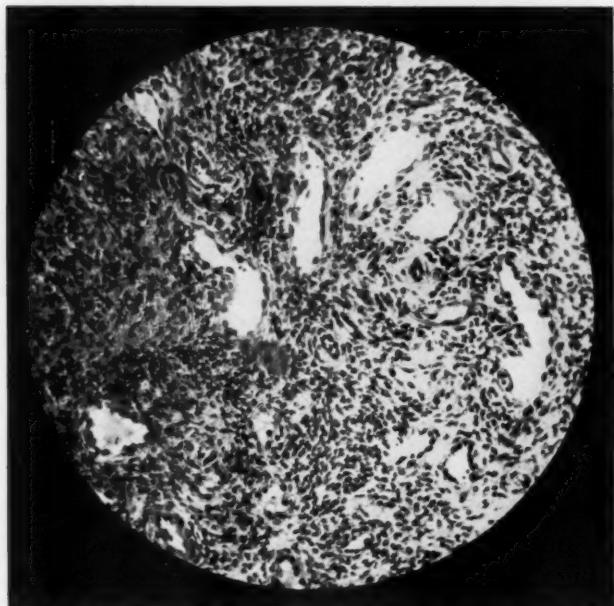


Fig. 1. Chronic inflammation near vocal cord. Tissue infiltrated with lymphocytes, plasma cells, fibroblasts.

the subglottic space is involved. If the deeper tissues are affected by the inflammation, and especially if the perichondrium or cartilage are attacked, two results may eventuate: First, abscess formation lying either between mucous membrane and perichondrium or under the perichondrium. These abscesses, as a rule, rupture into the upper air or food passages. If they point downward, the pus may invade the deep compartments of the neck and even reach the mediastinum. The second resultant of deep inflammation is a

chronic thickening of the perichondrium which ultimately shuts off the air passages. If the cartilage is attacked, it may be so injured that it is absorbed and a collapse of the larynx ensues. This is seen at times following a diphtheria and prolonged intubation with an oversized tube.

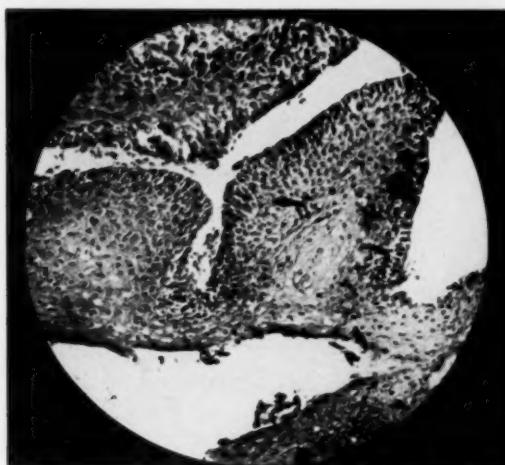


Fig. 2. Localized epithelial tumor in the case of chronic laryngitis.

Recalling that the structures of the larynx are always in active motion and consequently subject to trauma from over-use, it is not surprising that the larynx is subject to simple chronic inflammation of the mucous membrane. This brings it about that a great many tumors in the larynx are either inflammatory in origin or secondarily attacked by inflammation. Very often it is difficult to draw the line between an inflammatory tumor and a true neoplasm. Remember also that the larynx is subject to many chronic inflammatory diseases, the most important of which are tuberculosis and syphilis. The gross lesions of these diseases are often difficult to distinguish from each other, from simple chronic inflammation, and from benign and malignant neoplasms. Under the microscope their appearance is the same as that of syphilis or tuberculosis anywhere else in the body.

Neoplasms may, of course, derive their origin only from tissues which are normally present in the larynx. For instance,

you may find chondroma or osteoma, fibroma, angioma and various epithelial tumors. The really important tumors are those derived from connective tissue and from the epithelial lining. For instance, chondroma and osteoma are very rare; it has never been my fortune to see one or the other. On the other hand, tumors of the cords, either on their epithelial covering or on the supporting fibrous tissue, are very frequent, and of these two, those of the epithelium are more frequent than those of the fibrous or muscular tissue.



Fig. 3. Hematoma of the larynx, showing fibrous organization in one area.

As is to be expected, the cords, being the most active part of the larynx, are more frequently involved by both inflammatory and neoplastic pathology than the epiglottis or even the ventricular bands. Recall the histological appearances of a normal larynx. A section through the ventricular band, ventricle, and vocal cord shows the muscular structure of the vocal cord, the loose fibrous tissue of the ventricular band, and the stratified columnar epithelium of the ventricular band with cilia gradually changing to a stratified squamous epithelium over the vocal cord. The glands in the ventricular bands must also be noted. It is easily understood that neoplasms arising from these various regions have different characteristics.

It is well to remember that due to the continued activity of the larynx and due to its being subject to abuse from misuse and overuse of the voice, chronic inflammation takes a prominent part in all laryngeal pathology. The lesion is an infiltration of the connective tissue by lymphocytes, plasma cells and fibroblasts (see Fig. 1, Slide 1). Not only will the cords as a whole be inflamed, but inflammatory tumors are likely to arise at the points of greatest strain — such as the

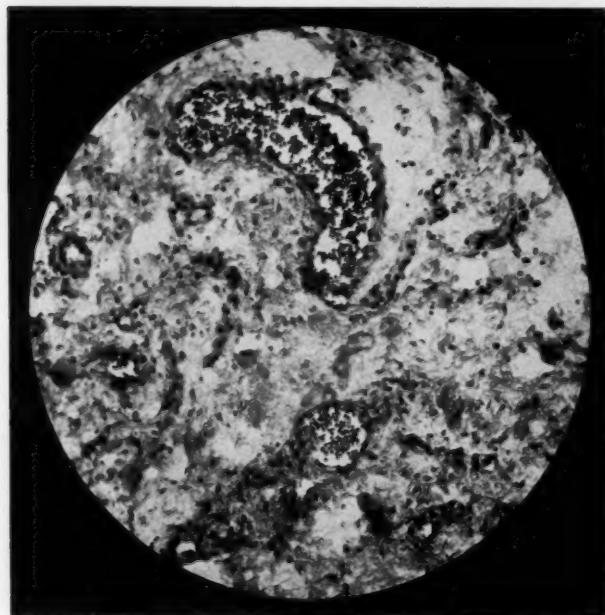


Fig. 4. High power of angioma.

tips of the vocal processes, or at the junction of the anterior and middle thirds of the cord. The so-called vocal nodules are likely to appear at these latter points. They are merely inflamed fibroma. In the course of a chronic laryngitis, local strains are apt to arise which cause tumor formation. These tumors may be difficult to differentiate since they are chiefly thickened epithelium. If they arise in a middle-aged man, they may cause real anxiety.

The second slide (see Fig. 2) illustrates such a tumor. This man was approaching the age of 60 years and had been under observation for three years for hoarseness. Examination of the larynx showed a thickening of the mucous membrane over the whole extent of both cords. At the end of three years, however, a tumor was noted at the junction of the anterior and middle third of the left vocal cord. It was removed and

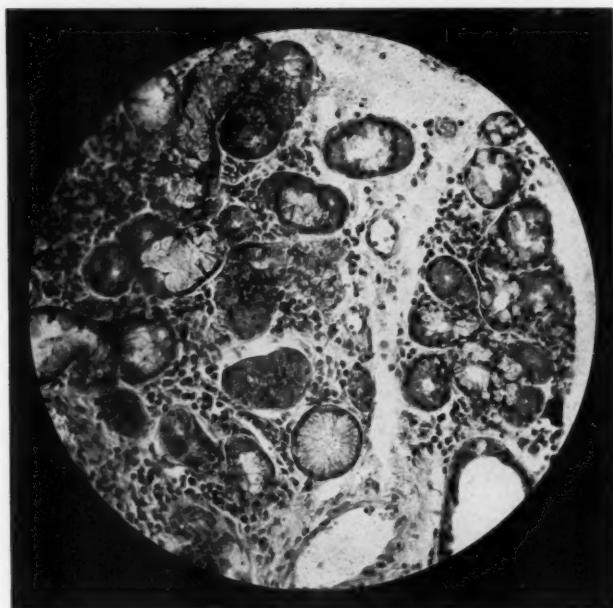


Fig. 5. Serous glands in the ventricular bands, showing chronic inflammation.

proved to be an epithelial tumor. The microscopic examination, however, showed that the cells retained their normal size, shape, and staining qualities and had no tendency to invade the submucosa. The subsequent history of the man has supported the diagnosis of a nonmalignant tumor.

The third slide shows tuberculosis in the larynx. It has the same histological characteristics as anywhere else in the body, showing giant cells and tubercle formation. Occasionally a tuberculous lesion will have the gross appearance of a malig-

nant neoplasm or a gumma, and only the tissue examination will differentiate. It must also be remembered that tuberculosis and cancer may appear in the same larynx at the same time.



Fig. 6. Cyst of the larynx.



Fig. 7. Hyperkeratosis.

Slide 4 (see Fig. 3) is a hematoma of the larynx. In one area you will see that it is beginning to organize. Such a tumor may organize to form a fibroma. Then, if, due to irritation, the epithelium is stirred to growth, they take on

the appearance of a papilloma. Hematoma frequently come from straining of the voice, such as shouting or yelling, and they are very likely to lead to persistent papilloma unless cured at once, which may be done by prolonged rest of the voice or removal.

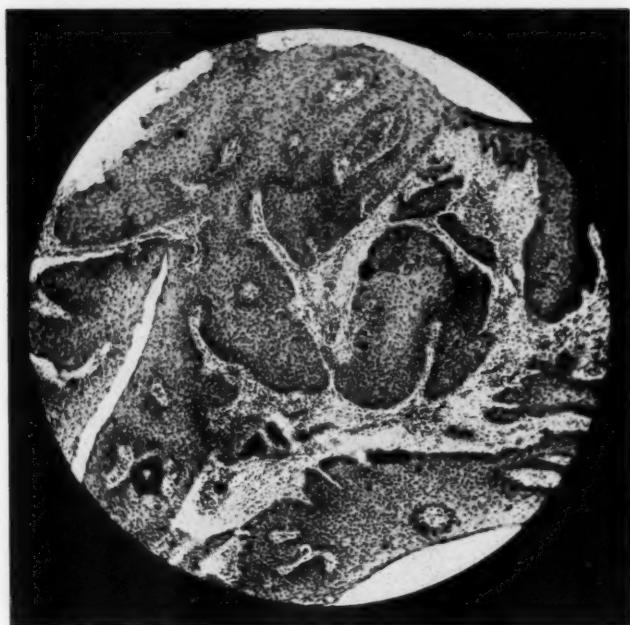


Fig. 8. Leukoplakia.

The next picture (Slide 5) (see Fig. 4) is one showing high power of an angioma made up of thin-walled capillaries. Angiomas may be true or false; for instance, if a hemorrhage occurs in a polyp or fibroma, the appearance may be that of an angioma.

Slide 6 (see Fig. 5) is of serous glands in an inflamed ventricular band. The result of such chronic inflammation about serous glands may be the formation of cysts, owing to the blocking of lymphatic and venous channels. Moreover, contraction of fibrous tissue about the duct of a gland may be the cause of cyst formation (see Fig. 6, Slide 7).

The next slide (Slide 8) shows a polyp of the vocal cord; it is loosely formed connective tissue covered with normal epithelium. Polyps may occur almost anywhere in the larynx. I have seen them on the vocal cords, beneath the vocal cords, in the anterior commissure, in the ventricles. As far as I know, they never become malignant. The only inconvenience they cause is hoarseness. Note the characteristics: A thin

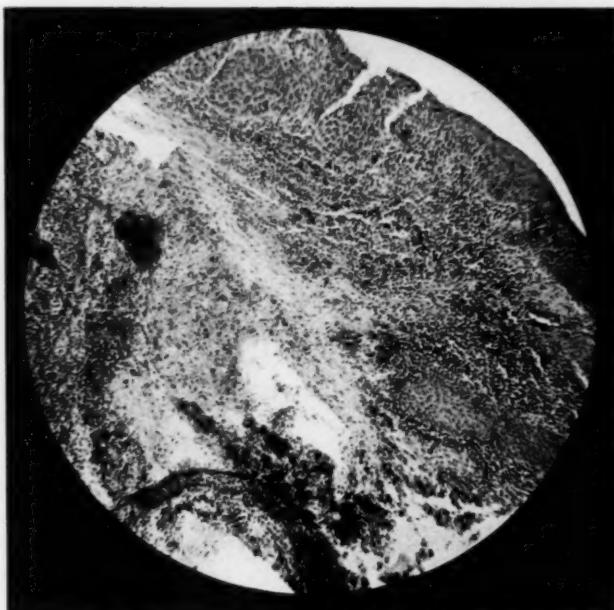


Fig. 9. Papilloma becoming malignant after 40 years.

layer of stratified epithelium, more or less cuboidal in shape at the base, becoming squamous on the surface; this difference in the deep cells and the surface cells makes possible the origin of two forms of epitheliomas — basal-celled epitheliomas from cells of deeper layers, and squamous-celled epitheliomas from surface cells. These latter are much the more frequent.

We may have malignant connective tissue tumors in the larynx. This (Slide 9) is a fibrosarcoma. They are quite

rare,¹ being only a small percentage of all the malignant tumors of the larynx.

The pathology of the epithelial lining of the larynx and especially of that covering the vocal cords is most important since this epithelium is most frequently affected by inflammatory thickening and by tumor formation.

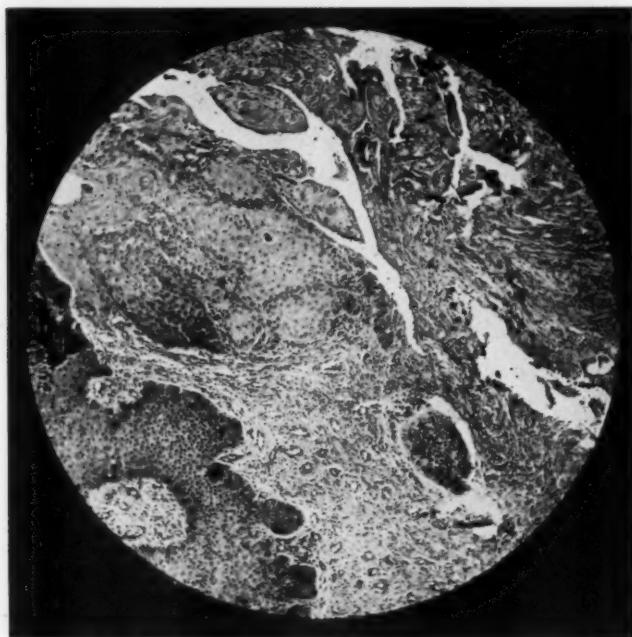


Fig. 10. Malignant change in a papilloma after 10 years.

One form that thickening of the epithelium of the larynx takes is hyperkeratosis (see Fig. 7, Slide 10). In the course of chronic inflammation the superficial layers of the epithelium become thickened and produce more keratin. The cells maintain their regularity in size, shape and staining qualities.

Slide 11 (see Fig. 8) shows leukoplakia. In leukoplakia there is the thickening of the superficial layers of epithelium and in addition there is likely to be inflammation in the

submucosa. However, in spite of the thickening in the epithelium, it does not invade the tissues and it maintains its regular arrangement and staining qualities.

Pachydermia laryngis is likely to occur posteriorly between the arytenoids. There is a localized hypertrophy of the epithelium, but the basal cells and the superficial layers maintain their proportion. Remember that in hyperkeratosis and leu-

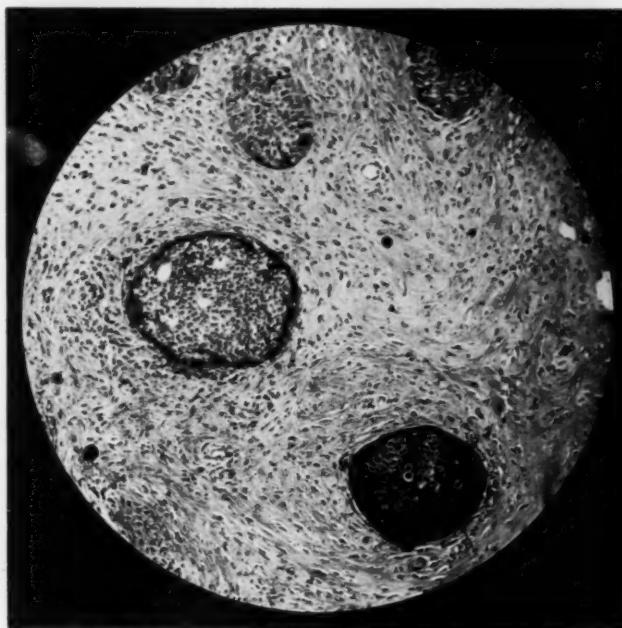


Fig. 11. Columns of epithelium in a papilloma reaching far down into the underlying connective tissue. Nonmalignant.

koplakia, it was the superficial layers of the epithelium that were thickened. In addition to the thickening of the epithelium in pachydermia laryngis, the connective tissue supporting the structure is also thickened. Thus, there is a thickening of the whole mucous membrane. If the epithelium becomes brushed off, leaving a raw surface, the result is a contact ulcer. The contact ulcer would show considerable inflammatory reaction in the submucosa.

Slide 12 shows papilloma of the larynx. Remember that a fibroma is a fibrous tumor with normal epithelium; that a polyp is a fibroma with a lot of fluid in its tissue. A papilloma is a fibrous tumor with hypertrophied epithelium.

Slide 13 shows a papilloma with chronic inflammation. Tumors in the larynx are peculiarly subject to trauma. Conse-



Fig. 12. Columns of epithelium in a papilloma invading underlying connective tissue. Malignant degeneration.

quently, they are likely to be inflamed. The consequence of the inflammation is that epithelial tumors, like papilloma, may become malignant.

Slide 14 (see Fig. 9) shows one area in which the cells have a tendency to become malignant and invade the underlying tissue. This is a papilloma which had existed for 40 years. Persistent recurrence, but the recurrence and the fact that you see mitotic figures in the tumor do not count. Only the invasion of subepithelial layers by epithelial cells and

the change in the size, staining qualities, and arranging of the cells are indications of real malignancy.

Slide 15 shows a normal cord which had a little tumor. The appearance of the cord and its motion were normal, but the biopsy showed that the thickened epithelium had a tendency to invade the submucosa. There may be no gross difference between inflammatory tumors and others. At the time when it is important to recognize malignancy, it can be done only by the microscope. This case brings forcibly to mind the great necessity for careful biopsy. Several were taken from this man's larynx and only the one showed malignancy.

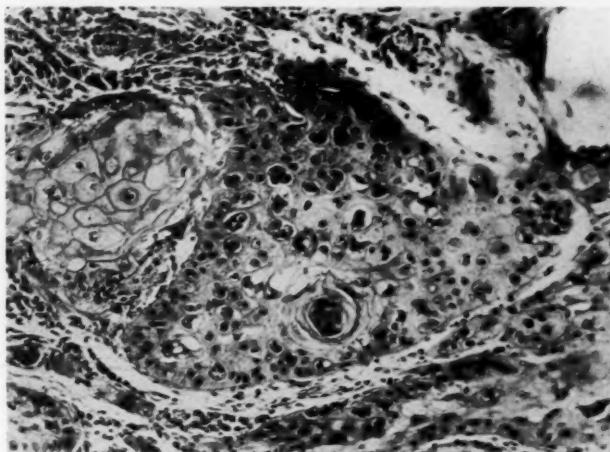


Fig. 13. Squamous-celled epithelioma of the larynx.

Now I wish to show a series of papilloma to illustrate the tendency of papilloma to become malignant. This specimen (see Fig. 10, Slide 16) was taken from the larynx of a woman who had had a papilloma for 10 years. There can be seen in the same field normal epithelium and epithelium becoming malignant.

Fig. 11 and Fig. 12 (Slides 17 and 18) should be compared. In Fig. 11 the section has cut across prolongations of epithelium deep into fibrous structure, but the cells show no abnormality. In Fig. 12 in these same prolongations of the epithelium can be seen pearl formation, an indication of malignancy.



Fig. 14. Low power of rhabdomyoma suggestive of malignancy.

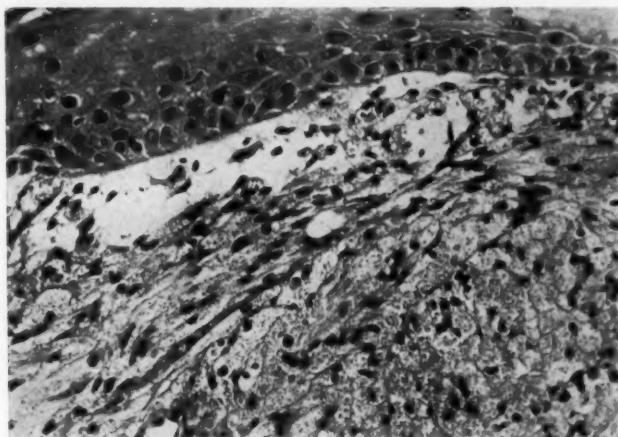


Fig. 15. High power showing its true nature as a muscular striated tumor.

In Slide 19 the growth is clearly malignant.

Fig. 13 (Slide 20) is a frankly malignant squamous-celled epithelioma showing great irregularity in size, shape and staining qualities of the epithelial cells and a tendency to pearl and keratin formation.

Fig. 14 (Slide 21) is of interest because the low power section is strongly suggestive of a malignant epithelial tumor invading the mucosa.

Fig. 15 (Slide 22) is a high power of the same tumor, showing it to be a myoblastoma, an example of the exceedingly rare muscle-celled tumors of the larynx of which only four or five have been reported.

103 East 78th Street.

AMERICAN ACADEMY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY.

Announcement is herewith made by the American Academy of Ophthalmology and Otolaryngology of a change in the 1937 convention site to Chicago, Oct. 10 to 15, 1937; headquarters, Palmer House.

It is with deepest disappointment, the officers, with the approval of the Council, have, because of mechanical difficulties, found it necessary to change the meeting place from Detroit to Chicago.

The Society regrets circumstances developed to prevent honoring the Detroit members by taking the 1937 session to their home city.

SOME PROBLEMS IN COSMETIC SURGERY OF THE NOSE.

DR. ARTHUR KOVACS, Milwaukee.

The external nose is one of the chief characteristics of the human face, in contrast to the animal, and for that reason the conspicuous esthetic significance of the external nasal structures, in shaping of features of the human face, render first eminence to the problems pressing for solution. The delicate and complicated make-up of the nasal framework explains the frequency of faulty or unproportional appearances encountered. The graceful curvature of the cartilaginous portion, the shape of orifices embraced, the prominence and proportion to the rest of the facial structure explain the tears and sadness of unfortunate persons lacking in these requirements.

Large flop ears are easily hidden under feminine coiffure; deformity of jaws and lips, in most cases, are accidental; wrinkles manifest themselves in more advanced age, when the personality is crystallized and the fate of the individual is sealed. Overdevelopment or unshapeliness of nose appears at time of puberty; in prime of life it is a handicap, materially or otherwise, just when life presents its most diversified problems.

The psychological aspects of nasal deformities are too manifold to enumerate. While some completely disregard them, just as frequently among females as males, others magnify insignificant disproportions to the role of a disaster. Gross deformity is often the source of emotional and nervous aberration and depression of various degree in hypersensitive individuals. Every surgeon doing this type of work encounters cases with imaginary defects; proper adjustment of such cases rightfully belongs to the psychologist. On the other hand, it is astonishing to see how complacently is tolerated an unshapeliness, of an otherwise pleasing face, that may be corrected in a few minutes, with practically no risk entailed.

It is not the purpose of this paper to describe in detail the procedures in different phases of corrective plastic nose sur-

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gery but rather to discuss some aspects which are generally not found in standard description of the different operations.

Anesthesia: Local anesthesia can be combined conveniently with avertin whenever an excited, irritable patient is coming under operation. The sound of rasps or application of the mallet brings the patient out of that composure which is so essential in carrying out the different manipulations. Bombardment of the surgeon with all kinds of questions, urging him to finish the work, etc., is not conducive to a satisfactory end-result.



Fig. 1. (1a) (1b) Clear cut deformity, long nose with hump on back. Esthetic profile angle within normal limits. Removal of hump by saw, mobilization of nasal bones, realignment of them, shortening of cartilaginous septum. If the frontal process is cut sufficiently deep the displacement of nasal bones should be carried out by pressure of thumb and not by application of mallet. Intact mucous membrane of the nasal cavity is the best safeguard against infection.

Sinus Trouble: It is a generally accepted axiom not to operate on individuals who harbor infection in the nasal cavity or sinuses. To patients, without intention of having these conditions corrected, this practice would tend to rescind plastic work for good. On the other hand, the bacterial flora of a chronic discharge is comparatively harmless to the bearer, due to the fact that his resistance has long since fortified him against that particular invader. I have transgressed the above mentioned practice on a number of patients without any sad result, but would certainly hesitate in case of an acute exacerbation of any chronic process.

Folliculitis, of the nasal vestibule, with the generally virulent streptococcus infection, should be subject to care before vestibular incision.

Selection of Cases: It is the duty of the plastic surgeon to refuse surgery in imaginary conditions or where the deformity is so slight that it does not justify an extensive procedure.



Fig. 2. (4a) (4b) Wideness of cartilaginous portion. Segment excision by knife, both from cartilage of the apex and triangular cartilage.



Fig. 3. Traumatic deformity of nose. Refracture and proper setting corrected the faulty position of nasal bones.

A hardly noticeable bony ridge on the dorsum of the nose, if removal cannot be expected with a simple rasp, will not justify total reduction of the whole nose. Replacement of a small inconspicuous scar with a probably larger one is certainly out of realm of ethical practice.

Plans: In making plans for cosmetic correction, a few facts should be kept in mind. Deviations of the osseous or cartilaginous frame to one side or other is a matter of close observation, as is wideness of the tip of the dorsum; however, in former cases, frequently only close analysis will determine whether the nasal bones proper are wide or the frontal processes of the upper jaw bones are responsible for the malformation.



Fig. 4. (6a) (6b) Removal of hump, mobilization of nasal bones, unification of new dorsum. In mobilization of nasal bones and frontal process of maxilla the technique described by Joseph is taken over by other authors (Saffian). However, it is unnecessary to saw the bone from the lower lateral angle of the apertura pyriformis; a shorter cut from about the middle of pyriform opening is a far simpler and easier technique. This modification was suggested by Dr. Z. Nagel.

It is evident that this modification does not apply to cases where the frontal process of the upper jaw bone partakes in the widening of the nose.

Careful consideration will allow a decision as to whether narrowing of the alar cartilages alone or in combination with the triangulares will yield a pleasingly slender nasal tip. In planning a new profile the determination of the esthetic profile angle will serve as guide. The esthetic profile angle is an imaginary angle, one branch of which is formed by the chin-glabella line, the other by the dorsum of the nose. This angle should be below 30°.

In shortening the nose, one must consider that its length, as Saffian points out, should be shorter than the root of columella-chin line.

The most unpardonable mistake is made when a hump is removed without mobilization of nasal bones and apposition

of their edges, thereby creating a wide nose. The improvement of the profile is overshadowed by the appearance of the front view, and later correction is considerably more difficult. Inasmuch the scar tissue formed between the bones will tend to separate them. Whenever feasible, corrective work should be done in one sitting.

735 North Water Street.

FOURTH INTERNATIONAL OTO-RHINO- LARYNGOLOGICAL CONGRESS.

The fourth International Congress of Oto-Rhino-Laryngology will be held in Amsterdam in 1940. The week from July 29 to Aug. 3 has provisionally been settled for the Congress.

A Committee of Honour has been appointed, composed of the professors of oto-laryngology in the Netherlands: C. E. Benjamins, Groningen; H. Burger, Amsterdam; P. H. G. van Gilse, Leiden; P. Th. L. Kan, Wassenaar; A. de Kleyn, Amsterdam; F. H. Quix, Utrecht; W. Schutter, Groningen; H. J. L. Struycken, Breda.

The Bureau of the Congress consists of the following members: Prof. H. Burger, Keizersgracht 317, Amsterdam C., President; Dr. A. A. J. H. Marres, Willemsparkweg 31, Amsterdam Z., Hon. Secretary; Dr. M. J. ten Cate, Obrechstraat 55, Amsterdam Z., Hon. Treasurer.

**NASAL HEMORRHAGE: LIGATION OF THE
ANTERIOR ETHMOID ARTERY.
CASE REPORT.**

DR. HENRY M. GOODYEAR, Cincinnati.

Most nasal hemorrhages arise from lesions in the anterior portion of the nasal septum and are accessible and amenable to treatment, but hemorrhages occurring in the posterior and upper part of the nose may tax our patience, and require drastic measures to save the patient's life.

When thromboplastic agents, local application, packing and cautery fail, it is necessary to resort to the ligation of a vessel.

Would you ligate the common carotid artery on the affected side? Such a procedure would be dangerous, especially in an elderly person, and unnecessary.

What branch of the carotid should be ligated in an intractable nasal hemorrhage?

In selecting the vessel to be ligated it is well to remember that the entire blood supply to the nose comes through the external carotid artery with the exception of the blood to the upper part of the nose, which is supplied by the anterior and posterior ethmoid branches of the ophthalmic artery, which in turn arises from the internal carotid.

In the literature are many reports of ligation of the common carotid in case of severe nasal hemorrhage, but few reports of ligation of the external carotid, which should be the vessel of choice with one exception; bleeding from the ethmoid vessels.

In cutting down the anterior wall of the sphenoidal sinus, injury and severe bleeding may occur from the sphenopalatine artery. Bleeding may occur immediately, hours, or some days after the operation. In these cases with diffuse bleeding it is impossible to see the bleeding point. One-half inch iodoform packing placed firmly in the region of the mouth of the sphenoid has proved satisfactory in controlling the hemorrhage in

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my cases.¹ If ligation is necessary the internal maxillary artery may be ligated by way of the usual opening for a radical antrum operation and opening of the posterior antrum wall. I have used this method preliminary to the resection of the sphenopalatine ganglion. The ligation of the external carotid would also suffice.

In all old people it might be dangerous to ligate either the external or interior carotid artery, and here the importance of ligation of the immediate bleeding vessel is to be considered.

Case Report: S. J., male, age 74 years, came to my office on Nov. 2, 1936, stating that he had had several attacks of bleeding from the nose at night, which were difficult to stop. No bleeding was noted upon massaging the septum or the floor of the nose. The bleeding recurred each night and became so severe that the patient was moved to Christ Hospital on Nov. 9. The blood pressure, blood sugar and urine was normal.

The bleeding point was located high on the anterior medial wall of the left middle turbinate. This point was cauterized with a 100 per cent solution of silver nitrate.

In spite of thromboplastic agents, packings and local cauterization, intermittent hemorrhages occurred. After a severe bleeding on the morning of Nov. 21, the patient was rightfully impatient and exhausted. There was a history of cardiac attacks of several years' duration. The possibility of a malignancy in the ethmoid region was considered, but Roentgenographs showed no abnormalities.

To ligate the external carotid would have no influence on bleeding from this area, and to ligate the internal carotid would be precarious in a somewhat frail and aged patient. It was decided to ligate the anterior ethmoid artery.

Under local anesthesia a curved incision was made just below the eyebrow and into the side of the nose. The tissues were elevated over the lamina papyracea and the anterior ethmoid artery exposed. It was a large vessel and, after ligation, was severed medially and the wound closed.

The patient, without further bleeding, left the hospital three days after the operation and has remained well.

I have found that several standard books on anatomy mention that the anterior ethmoid artery is often a comparatively large vessel, while the posterior ethmoid artery is usually noticeably small and relatively unimportant.

With intractable bleeding from the anterior ethmoid area ligation of the anterior ethmoid artery is apparently effective, and a relatively simply and safe procedure.

REFERENCE.

1. GOODYEAR, HENRY M.: The Etiology and Treatment of Hemorrhage of the Nose and Throat; Practical Considerations in Relation to Otolaryngology. *Amer. Med. Assn.*, Vol. 107, pp. 337-341, Aug. 1, 1936.

556 Doctors Building.

CONTRIBUTION TO THE TREATMENT OF VASOMOTOR RHINITIS.*

DR. ALFRED LEWY, Chicago.

For the control of this disorder various more or less caustic applications, surgical measures and ionization have been advised, and the duration of the symptomatic relief seems to be in direct proportion to the severity of the insult to the tissues. In searching for something that would bring about the maximum of relief with the minimum of damage, I began about two years ago to use resorcinol locally. This was further tried out by my associates at the Illinois Eye and Ear Infirmary, Dr. D. Doseff, Dr. E. J. Blonder, Dr. F. Piskiewicz and Dr. J. Prohavnik, besides a number of other colleagues who were kind enough to cooperate. I believe that sufficient time has elapsed and enough cases have been treated to warrant bringing this agent to the attention of the profession. The proportion of successes has been considerably greater than with any other treatment with which I am familiar, and the reaction less.

Resorcinol, C₆H₄ (OH)₂, appears as colorless crystals, becoming salmon color on exposure, according to Cushny, resembles phenol in its action, but is less poisonous and more antiseptic. It is very soluble and is applied in the form of a watery paste over the entire nasal mucosa, including the middle meatus, after a preliminary application of 3 per cent cocaine. It causes a whitening of the membrane similar to that seen after application of trichloracetic acid; but the discomfort, sneezing and watery discharge as a rule do not appear until the effect of the cocaine wears off and, as a rule, is not severe enough to interfere with the patient's usual duties. Sensitive patients may be given 1½ gr. pentobarbital immediately after the application.

The relief may last from a few weeks to several months, and in a number of cases treated about two years ago there

*Read before the Chicago Laryngological and Otological Society, March 1, 1937.

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has so far been no recurrence. Its use in the ragweed hay fever has not been encouraging in my hands. Other remedial measures may be used at the same time, *e. g.*, hypodermic use of free iodin as suggested some years ago by Glasscheib and reported by me to the Chicago Laryngological and Otological Society. One of us (E. J. B.) combines with the application bipolar diathermy of the inferior turbinates and believes that thereby he achieves a more certain relief.

Resorcin has been used in dermatologic practice and as an antiseptic. I know one otologist who used it for reducing granulation tissue in chronic suppuration of the ears, and another who uses it for aphthous stomatitis, but I do not know of its use as described above. Shoemaker's *Materia Medica*, published in 1893, mentions that it has been recommended in hay fever, but does not describe the method of its use.

25 East Washington Street.

HISTORICAL ASPECTS OF BONE CONDUCTION.

NOBLE H. KELLEY, Ph.D., Iowa City, Iowa.

The phenomenon of hearing sound conducted through the cranial bones was known as early as the sixteenth century. Phillipus Ingrassia (1510-1580) was one of the first to report the discovery (24, p. 88^{*15}).† In his work, edited postmortem in 1603, he reports his observation that sound could be heard through the teeth. Hieronymus Capivacci, writing in 1589, made the first application of bone conduction to clinical otology. He placed one end of a rod between the teeth of a patient with impaired hearing and the other end in contact with the vibrating string of a musical instrument, the zither. If the patient heard the tone, he diagnosed the deafness as a disease of the drum membrane; if he did not hear the tone, as a disease of the labyrinth (24, p. 143^{*5}). Felix Platter, writing in 1602, substantiated the above observations.^{*19} It was Schellhammer, however, who in 1684 experimentally proved that sound conveyed through the teeth was transmitted by the cranial bones and not by way of the Eustachian tube. This was accomplished by holding the stem of a vibrating fork in the closed mouth between the teeth; in one instance touching, in the other, not touching the teeth (24, p. 213-214^{*31}).

The above observations and experiments represent the earliest contributions to the history of otology, accompanying, as they do, the development of anatomical and physiological knowledge of the organ of hearing. Berengario of Carpi discovered the first two bones of the ossicular chain in 1521 (24, p. 74-75^{*1}). These were named the malleus and the incus by Vesalius in 1543 (24, p. 83^{*36}). Ingrassia discovered and named the stapes in 1546. He also described both the fenestra ovali and the fenestra rotunda, and mentioned the semicircular canals and the cochlea (24^{*15}). It was Thomas Willis (1622-1675), however, who established the fact that the organ of hearing was in the cochlea. He accomplished this by tracing the course of the cochlear nerve (24, p. 184^{*39}). In 1704, Valsalva reported that the laby-

†See bibliography for explanation of the asterisk.

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rinth was filled with liquid, but at the same time he believed that there must also be air within for the stimulation of the nerves for hearing (24, p. 230-243¹²). Cotugno overthrew the tradition of *aer ingenitus* (air within the labyrinth) and in 1760 definitely established that the labyrinth was filled only with liquid. This discovery came from the examination of fresh cadavers, rather than those that had been dead for some time (24, p. 253¹³). In 1769, Scarpa discovered the membranous labyrinth (24, p. 264¹⁴).

New developments in the field of bone conduction also took place at this time. Haller, in 1757, emphasized the importance of distinguishing between air and bone conducted sound (24, p. 313¹⁵). In the same year, Jorissen made practical application of the phenomenon of hearing by bone conduction in the construction of probably the first bone conduction type of hearing aid. This device consisted of a rod of wood, known as Jorissen's stem. One end of the stem was placed between the teeth of a person with impaired hearing and the other end in contact with the teeth of the speaker, the sound vibrations being transmitted through the stem and thence through the cranial bones to the organ of hearing. Beethoven took advantage of this method of hearing sound by bone conduction (20, p. 314; 12, p. 345).

The nineteenth century marked the beginning of more interesting revelations concerning the problem of bone conduction. In 1827, Wheatstone utilized the tuning fork* in the discovery that under certain conditions one's sensitivity for bone conducted sound is considerably increased (38, p. 67-69). This aspect of the problem has in later literature been termed the phenomenon of "increased" or "prolonged" bone conduction. Wheatstone observed that if the entrance to the external auditory meatus be closed without pressure by the finger the sounds of the voice are greatly augmented. Following up this observation, he discovered that:

"Placing the conducting stem of a sounding tuning fork on any part of the head, when the ears are closed as above described, a similar augmentation of sound will be observed. When one ear remains open, the sound will always be referred to the closed ear, but when both ears are closed, the sound will appear louder in that ear the nearer to which it is

*The tuning fork was invented by John Shore¹⁶ in 1711.

produced. If, therefore, the tuning fork be applied above the temporal bone near either ear, it will apparently be heard by that ear to which it is adjacent; but on removing the hand from this ear (although the fork remains in the same situation) the sound will appear to be referred immediately to the opposite ear."

In the same publication he writes concerning his water-filling experiment as follows: "If the meatus and concha of one ear be filled with water, the sounds above mentioned will be referred to the cavity containing the water in the same way as when it contained air, and was closed by the hand."

E. H. Weber confirmed Wheatstone's discovery in 1834 (27^{**7}).

In 1855, Rinné described his procedure of comparing hearing acuity by bone conduction with that by air conduction. He held the stem of a vibrating tuning fork against the upper incisors until it was no longer heard, and then placed the vibrating tines of the fork at the entrance to the external auditory meatus. He discovered that the normal ear heard the fork longer by air conduction than by bone conduction. But, what is more important, he observed that if a lesion existed in the sound conduction apparatus, the sound was heard longer by bone than by air conduction.^{27,*28} It should be noted, however, that the principle in this procedure was known and utilized by Capivacci in the diagnosis of deafness in the sixteenth century.^{*5}

Despite the important discovery by Wheatstone, its confirmation by Weber, and the contribution made by Rinné, the accepted instrument in 1860 for the measurement of hearing was not the tuning fork but the watch (25, p. 76). The distance away that the tick of the watch could be just heard was the unit of measurement employed. This procedure permitted a quantitative statement for air but not for bone conduction. Watch tests could not be standardized because of the variation in the intensity and the tone quality of the sounds emitted by different watches. In order to standardize a functional test for air conduction, Adam Politzer constructed the acoumeter, an instrument which emitted a noise like the tick of a loud watch, and which normally could be heard a certain distance. It also had a special feature which

permitted the testing of bone conduction; but neither the watch nor the acoumeter permitted measurement of the absolute intensity of sounds heard through the cranial bones.

Conta, in 1864, emphasized the practical value of the tuning fork in testing hearing.⁴ As a statement of auditory acuity, he used the time perception of the tuning fork tone, rather than the distance away that a watch could be heard. In the work of Politzer, Bezold and Lucae, the experiments of Weber and Rinné were revived and made the basis of two of the three major functional bone conduction tests used in clinical otology. These are commonly referred to as the Weber and the Rinné tests (25, p. 76¹⁷). The third major diagnostic test was contributed by Schwabach.³² The Schwabach test informs the examiner whether the bone conduction of the observer is increased or reduced. This is accomplished by comparing the bone conduction sensitivity of the observer with that of the examiner, in terms of the length of time the fork is heard. The fork is placed on the mastoid portion of the temporal bone of the observer, and when no longer heard is transferred to the same location on the examiner. The procedure may also be reversed.^{32,33,34} In this test the sensitivity of the reference ear must be known.

Schwabach was the first to state that in case of obstruction in the sound conduction apparatus, a vibrating tuning fork brought in contact with the cranial bones is heard longer than in the normal ear; but on the other hand, when lesions exist in the inner ear, the perception time is shortened (26, p. 153³²). This marks the beginning of the theory that there is increased bone conduction in ears with conductive lesions and decreased bone conduction in case of lesions of the auditory nerve. Mach, Bezold, Lucae, Bing, Politzer, Siebenmann and others presented theories to explain this phenomenon of increased bone conduction, which had been revealed by Wheatstone in the normal ear, and mentioned by Schwabach as occurring in the pathological middle ear. Adequate theory has depended, however, on more refined methods of experimentation.

Several experimental investigations have been made on the problem of "increased" bone conduction in the normal ear. Runge, in 1923, repeated the water-filling experiments of

Wheatstone, and found that if the normal ear be filled with water, the duration of perception of the sound of a tuning fork by bone conduction is doubled for frequencies up to 512 c.p.s. Above this frequency the reaction was not so pronounced.²⁰ Downey, in 1925, repeated the procedure, and his results confirmed those of Runge.⁹ Fowler, in 1925, studied the effect of closure of the external meati on bone conduction acuity. Using a 256 c.p.s. fork, the damping constant of which was known, he found that occluding the ears of two observers lowered the threshold for bone conducted sound by about 14 to 16 sensation units.¹¹ Hallpike, in 1930, reports a study in which he concludes that there is little after-perception on occlusion of the meati. Since his study was made in the silence room of the Royal Ear Hospital, London, he advanced the explanation that the increased bone conduction reported in other studies was due to the "screening" effect that occlusion had on external noise stimuli.¹⁴ Dean also expressed a similar interpretation.⁸

Pohlman and Kranz, recognizing the inadequacy of tuning forks, approached the problem by means of a vacuum tube oscillator and a special bone conduction receiver. The data secured from a series of three investigations^{21,22,23} showed marked variations. But they found, in general, that occluding the external meati with wax or filling it with water lowered the threshold for bone conducted sound for frequencies ranging from 128 to 1024 c.p.s. At 2048 c.p.s. occlusion or filling had little or no effect. Knudsen and Jones found that in a soundproof room, when the canal is occluded with wax, the acuity for bone conduction is increased 10 db. (16, p. 490). Further experimentation on normal and pathological ears is necessary before adequate theory can be developed on the phenomenon of "increased" bone conduction.

Another important consideration in bone conduction is the factor of transcranial decrement. This refers to the decrease in intensity of sound due to propagation through the cranial bones. Using a 256 c.p.s. tuning fork, Fowler found that the vertex-mastoid decrement, with the ears open or occluded, was about 16 sensation units.¹¹ Pohlman and Kranz measured forehead-mastoid decrement for frequencies ranging from 128 to 2048 c.p.s. and reported values ranging from 3 to 12 db.²³ Dean, using two observers with complete unilateral deafness, found that the decrement between the two mastoids was three

decibels to the nearest unit. Using nine normal observers, he measured forehead-mastoid decrement for frequencies ranging from 362 to 2048 c.p.s. and reported values ranging from 3 to 8 db.* The importance of a consideration of transcranial decrement values in making threshold measurement for bone conduction may be illustrated in the case of complete unilateral deafness. With the bone conduction receiver on the mastoid adjacent to the deaf ear, the threshold values obtained will differ from those of the normal ear opposite only by the amount of transcranial decrement.

This review has attempted to select and to integrate significant developments in the history of hearing sound by bone conduction. The importance of this phenomenon in mapping the sensitivity of the cochlea and also in the field of mechanical aids for those with auditory impairment is today unquestioned.

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THE AMERICAN LARYNGOLOGICAL, RHINOLOGICAL AND OTOLOGICAL SOCIETY, INC.

The 1937 annual meeting of the Society will be held at the Hotel Traymore, Atlantic City, N. J., Thursday, Friday and Saturday, June 3, 4 and 5.

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American Otological Society, Lido Club, Long Beach, N. Y., May 27-28.

American Laryngological Association, Atlantic City, May 31, June 1-2.

American Bronchoscopic Society, Atlantic City, June 2.

American Laryngological, Rhinological and Otological Society, Atlantic City, June 3-5.

American Medical Association, Atlantic City, June 7-11.

Because of the lowering of railroad rates in general, reductions are no longer offered for conventions, therefore no special transportation arrangements will be made.

Further details will be given in the program which you will receive in due time.

20 YEARS' EXPERIENCE WITH IODINE POWDER (SULZBERGER) IN THE CONSERVATIVE TREATMENT OF AURAL AND NASAL SUPPURATION.*

DR. M. D. LEDERMAN, New York.

In presenting my personal experiences of over 20 years with a conservative, simple and effective treatment of aural and nasal suppuration, I do so, knowing that some of my colleagues are able to corroborate the results obtained with iodine powder (Sulzberger), and I beg the indulgence of those who are already familiar with the effectiveness of this powder in the treatment of chronic suppurative disease of the middle ear.

It has taken many years to establish this simple combination of iodine and boracic acid (prepared after the technique of Dr. N. Sulzberger, chemist) in the position it deserves in aural and rhinological therapy.

We realize the difficulty of having conservative measures accepted in the treatment of disease, especially since we have been taught for years that surgical intervention was the *sine qua non*.

I believe that the numerous endorsements received from colleagues throughout this country and from abroad, together with frequent references to its effectiveness in otological literature, warrant my efforts in bringing this active combination to the attention of the profession.

The pendulum of heroic and meddlesome surgery in diseases of the ear and nose is gradually assuming a more level arc, and the older we grow the more our respect increases for Nature's activity in overcoming local infections. Those of us who have had the privilege of looking backward for two score years can readily visualize the truth of this statement.

As I mentioned in a previous paper² on this subject, "we should give deliberate and conscientious consideration to the

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importance of the economic question for those suffering from chronic suppurative involvement of the middle ear, and we must attempt to conserve as much auditory function as the existing pathology permits."

My experience warrants the conclusion that with careful attention to proper preparation of the middle ear, attic, Eustachian orifice and hypotympanic space, before the powder is applied, numerous instances of prolonged chronicity of middle ear involvement have remained dry, with useful hearing, notwithstanding the fact that radical surgery had been suggested by others. The following brief history of a characteristic case demonstrates the efficacy of the powder.

A physician, suffering from suppurative disease of both middle ears for a period of nearly 50 years, was advised to have his ossicles and drums removed from both ears, with probable loss of serviceable auditory function. Such an outcome would have handicapped him in medical practice. By this simple dry treatment he was cured of his long standing disease in six months, with preservation of useful hearing. In this instance, cholesteatoma and granuloma were present, and disease in the attic had to be cleared up before the powder in various percentages arrested the infection.

This patient has been under observation at irregular intervals for the past six years, and occasionally some epithelial debris or cerumen in the attic region will dim the hearing function; but on removal of this mechanical obstruction useful perception of sound is again established.

My experience with iodine powder (Sulzberger) impels me to state that unless active indicative symptoms of a fulminating character exist, it is our duty to employ this simple effective conservative treatment and avoid surgical intervention.

The indications for radical surgery with probable loss of serviceable auditory function, not to mention possible complications, must be distinct and urgent before so drastic and serious a measure is suggested.

The duration of the suppurative disease plays no deciding role in advising heroic measures. That this opinion is not shared by me alone, I herewith quote the statement of Dr. Joseph C. Beck, of Chicago, from his paper on "The Non-surgical Treatment of Chronic Middle Ear Suppuration."²

"Surely we all agree that even if a radical mastoid operation is well performed, in many instances much remains to be desired in obtaining a cessation of the discharge and a conservation of hearing." He further remarks that "he has yet to see a case of chronic suppuration of the middle ear, that he has treated and continued to observe, develop any serious intracranial complications. There are always present signs and symptoms in plenty of time to warn and place indications for an operation." In his paper Dr. Beck gives his experience with the powder in 30 cases in private practice and endorses the efficacy of the powder in drying up most of these ears.

My records show cases of 25 to 50 years' duration of the disease that have responded to this active powder; and in the otologic literature other observers have mentioned similar results after the use of this remedy.

Personal experience corroborates the observations of Dr. Beck. A number of cases have been under my care for persistent suppuration of the middle ear following radical operations performed by competent aurists, where cleansing of the residual cavities and the application of iodine powder succeeded in drying the ear.

With so much clinical data recorded by other observers, I feel that the premises mentioned in my papers^A on the subject of conservation in the treatment of aural suppurations are thoroughly justified, notwithstanding the period of its duration.

To obtain satisfactory results from the use of iodine powder, one must be conscientious in preparing the field for its application. It takes time and thoroughness to cleanse and dry a middle ear and its adjacent areas (attic, Eustachian orifice and hypotympanic space) from debris, accumulated secretion, cholesteatoma and granuloma. As a rule the bacteriological findings show a mixed infection and do not indicate any specific need of vaccine therapy. In some of my cases where susceptibility to acute exacerbations existed, some form of non-foreign protein was injected to stimulate resistance.

We take for granted that any nasal or postnasal pathology is given due attention. It is advisable to have X-ray photographs taken to give as much information as possible, but

my experience justifies my opinion that the local picture is the important factor in judging the progress of the disease and the effectiveness of the treatment under discussion.

The technique that has proven satisfactory in my cases and in the experience of others who have requested detailed suggestions in the use of iodine powder (Sulzberger) in aural and nasal infections is as follows:

First: Irrigations to cleanse the ear are forbidden. In contemplating the irritation and the maceration of the epithelial tissue in the auditory canal and middle ear, consequent upon daily douching over a period of years, in these chronically discharging ears, one must realize the lowering of tissue resistance that such moisture produces.

Second, and most *important*, the canal and middle ear cavity must be cleansed as thoroughly as possible. This is best accomplished by repeatedly using small applicators armed with cotton—not simply removing the secretions in the canal or at the perforation. It means the employment of curved applicators to enter the perforation and the attempt to reach the attic, hypotympanic space and Eustachian orifice in the middle ear. Needless to state, any pathological tissue must be eliminated—granulations of sufficient size and diseased ossicles, if visibly involved. I have seen papillary hypertrophy of the middle ear mucous membrane subside under the iodine powder used in increasing strengths. The larger the perforation of the drum, the more rapid the action of the powder, since a greater quantity can be introduced into the middle ear. When the perforation is small, it should be enlarged so that the powder can reach the diseased area. At times, gentle suction is employed to remove secretion from the middle ear by means of a small glass or metal cannula. Discretion must be employed in using this method, as some patients readily show disturbance of the vestibular labyrinth if too strong suction is applied. One should never attempt suction by using any instrument which completely closes the external canal. Such heroic methods may cause very annoying symptoms, or even hemorrhage in the labyrinth and middle ear. After all secretion has been removed, the canal and middle ear are cleansed with alcohol (95 per cent) and then dried. The thorough cleansing of the canal and middle ear is a very important factor in the ultimate success of the treatment in

these chronically diseased ears. Many of my cases required much time and patience before the middle ear was in a proper condition to receive the application of the iodine powder, but the ultimate result fully rewarded faithful attention to this necessary detail.

The final procedure is to insufflate the iodine powder into the middle ear through the perforation. This can best be accomplished by using a Lederman hard rubber insufflator with a shovel arrangement on the distal section. The insufflators in the stores have a curved extremity; this curved portion should be cut off and the end sandpapered in order to remove the rough edges. The straight end should not be over 3 inches long, to give complete control of the instrument when pressing upon the rubber ball. The colored DeVilbiss powder bottle with Lederman extension may also be used; but one must not employ too much air pressure, or most of the powder will be forced out of the middle ear and canal. For initial treatments a 1 per cent iodine powder (Sulzberger) is used. The applications are given regularly, depending upon the quantity of the secretion present at successive visits. I have at times found it necessary to give daily treatments when the secretion was profuse; but as it subsided, the treatments were given on alternate days. The majority of my patients received two treatments a week, always depending upon the amount of secretion present at the next visit. No home treatment is allowed except when the patients live out-of-town or cannot appear regularly; then a teaspoonful of the powder to 1 ounce of alcohol is prescribed. The individual is instructed to cleanse the canal and remove as much of the secretion as possible with cotton-tipped toothpicks, and then to instill 10 drops of this solution into the canal, with the diseased side of the head uppermost. This position should be maintained for 15 minutes. Dr. Beck prescribes a glass tube with rubber ball attached for use in this home treatment. The powder is gently forced into the glass tube by pressure and then blown into the ear by compressing the rubber bulb. We realize that the diseased areas are not properly cleansed with such procedure, but it assists in getting some of the medication to the diseased part and prevents the patient from using irrigations. When the secretion remains about the same quantity after a number of treatments have been given, a stronger iodine powder (2 per cent) is used. Frequently this may be employed

without local anesthetic, but some individuals are sensitive and complain of a smarting or burning sensation. In such cases a weak cocaine-pantocaine solution or larocaine should be applied to the middle ear before the powder is introduced. In very chronic cases I have used as high as 5 and 10 per cent iodine powder without unpleasant reaction. Some skins are sensitive and frequent application of the powder may give rise to a local dermatitis, but this has been rare in my experience. To avoid possible discomfort, any bland ointment—boric acid, lanolin, white vaseline or cresatin ointment—may be lightly painted on the floor of the canal before the powder is introduced.

The query naturally arises: To what virtue of this iodine powder (Sulzberger) can one attribute its activity and the results obtained in these cases of prolonged chronicity?

The preparation is an intimate association of iodine with boric acid, the same being prepared by mixing an iodine solution of desired strength with dry, finely powdered boric acid and evaporating the solvent. When carefully and properly done, this results in an impalpable powder of boric acid finely impregnated with the desired amount of iodine. The action of the powder is due to the iodine, which, as the boric acid dissolves in the secretions, is liberated in a most minute division and then spreads over and penetrates deeply into the tissues. Furthermore, owing to the solubility of its boric acid content in the secretions, there is no danger of retarded drainage, as in the case with many iodine powders. This is a most desirable quality. A prompt osmosis occurs, which permits the iodine vapor to reach areas which instrumentation never touches. Hence we have an active germicide which exerts its power as long as there is any powder remaining in the diseased cavity. This powder does not cake, but is completely dissolved within 48 hours, depending on the quantity of the secretion present in the infected ear; therefore, one need not worry about retarded drainage—surely a very valuable asset of this effective remedy. To me, its activity has been a revelation, and numerous colleagues have published satisfactory results (see references) when suggestions referred to in the method of application were followed. At this time I caution those who are interested in the dry and conservative treatment of aural and nasal diseases, to see that they

obtain the original iodine powder, made after the formula of Dr. Nathan Sulzberger.

Attempts have been made to substitute combinations of boric acid and iodine for the original Sulzberger powder, and some of my friends have spoken to me in reference to the matter, stating that their results with some of the powder they obtained were not as satisfactory as with the original powder.

In a paper published by Dr. R. Scott Stevenson,⁵ surgeon to the Metropolitan Ear, Nose and Throat Hospital, London, England, he reports 95 per cent cures with the dry treatment of chronic suppuration, with iodine powder (Sulzberger). He explains the effectiveness of the powder on the basis that free iodine reaches the recesses of the infected ear. He further remarks that there need be no fear of retarded drainage, because this powder of boric acid and iodine dissolves in the secretion.

During a visit to London two years ago, Dr. Stevenson enthusiastically told me of a young physician at the above hospital who had two mastoid operations performed by a prominent aurist on the same ear for acute mastoiditis. The second operation was thought necessary on account of a persistent odoriferous discharge from the ear, but it did not result in diminishing the discharge. Various medication was tried without success. Though the patient was much annoyed with his condition and at first refused any further local treatment, Dr. Stevenson finally obtained his cooperation in trying the iodine powder, and after a few treatments the ear became dry. Similar results have occurred in my own practice.

In a communication from one of my patients, she writes: "I do not know how to thank you for all you have done for me, for after suffering from a supposedly incurable ear condition for about 25 years, and having you cure it in a few treatments, leaves me with a sense of astonished gratitude."

While I could report other instances of prolonged suppuration of the middle ear that have responded in a rather prompt manner, unfortunately this is not the rule; it takes patience upon the part of the physician and cooperation by the patient.

Careful and thorough preparation of the diseased ear cannot be accomplished by two or three attempts to remove debris

and secretion from the middle ear and attic. Where the disease has existed for a long time it requires time and persistence to obtain a dry field before the powder is applied. At times one is surprised to find the quantity of debris that is present in these ears. Not infrequently it has taken over 30 minutes to clean out the middle ear and attic before I was satisfied that the ear was in proper condition to receive the powder. Some of my cases have informed me that they have had powder treatment of a similar kind, but their medical attendant did not spend much time in cleansing the ear. As I mentioned in my technique this part of the procedure is a very important factor in the final result.

I have seen a number of mastoid fistulae, following the operation for acute mastoiditis by other aurists, which have not healed. In these cases, after removing excessive granulation tissue and not discovering any sequestrae, the cavity was filled with the 2 per cent iodine powder, without repacking, except for a small drain at the skin surface.

All oozing should be stopped before the powder is introduced into the wound. A solution of neosynephrine (1 per cent) is very effective in controlling the bleeding; treatments must be carried out on alternate days, depending upon the quantity of secretion present. In a few cases large cavities responded to this simple measure, with epithelial growth of adjacent skin appearing in a comparatively short time.

The distinctive advantages of iodine powder (Sulzberger) is that it readily disintegrates in secretions; that it gives off its iodine content very promptly and, last but not least, it does not cake, thus permitting necessary drainage.

To emphasize the above statements, I herewith quote an editorial observation taken from the 1935 Year Book on Eye, Ear, Nose and Throat.

"Iodoboric powder (Sulzberger's powder) in our experience has distinct advantages over boric powder alone, and in cases where careful cleansing measures and the use of boric powder alone have failed to produce a dry ear, even after prolonged treatment, a few applications of Sulzberger's powder have produced a dry ear. As in any form of treatment for chronic otitis media, thorough preliminary local cleansing is essential.—ED."

In an interesting and scholarly paper by Dr. Guy M. Maness, of Nashville, read before the Eye, Ear, Nose and Throat Section, of the Tennessee Medical Association, 1932,⁶ the author states, "for the treatment of chronic otorrhoeas a powder is more ideal than a solution, providing the powder does not cake and obstruct the drainage. The iodine powder (Sulzberger), first employed by Dr. Lederman, meets the above requirements better than anything I have used." In this paper the author reports 68 cases of chronic and sub-chronic suppurative otitis media treated with iodine powder (Sulzberger). In accompanying tables his results are given. A few of the cases had mastoid surgery because their symptoms warranted surgical intervention. The duration of drainage and the location of the perforation did not seem to make much difference in obtaining a dry ear. The author uses the 2 per cent iodine powder (Sulzberger).

Some of the cases which responded to the powder treatment had discharge from the ears for nine to 19 years. Dr. Maness is of the opinion that the dry treatment of chronic suppurative ears is the best nonoperative treatment. He agrees that the condition should not be treated by irrigation and that iodine powder (Sulzberger) is a valuable adjunct in the treatment of this ailment.

In a personal communication from Trondhjem, Norway, Dr. Bertram Danelius, a prominent aurist and laryngologist, writes, stating that he had used the iodine powder (Sulzberger) in 20 cases of ear suppuration and had excellent results. He was then preparing a paper on its activity to read before a meeting of Norwegian otologists.

One of the most recent publications on this effective remedy is an excellent and exhaustive paper entitled "The Conservative Treatment of Chronic Suppurative Media. Efficacy of Iodine Dusting Powder, etc.," by Dr. R. Klein, of Camden, N. J., presented as a candidate's thesis to the American Laryngological, Rhinological and Otological Society.⁷ For more than two years the author has been using iodine dusting powder (Sulzberger) and his paper is largely devoted to the rationale and technique of its use. In his summary of 30 cases, some of which had recurrent secretion for periods of 12, 16, 40, 45 and 50 years, his results on re-examination eight months later have been most impressive. His paper takes up various

procedures advocated in the treatment of the chronic infections of the middle ear, and in his reference to the dry form of treatment he concludes, "That the result obtained, by the use of iodine powder, justifies emphasizing this method of treatment." The cases reported included only private patients, upon whom it was possible to keep a follow-up record." In the author's opinion "iodine powder (Sulzberger) is a satisfactory local antiseptic and deserves a definite place in the conservative treatment of chronic suppurative media."

It may be of interest to report briefly a few unusual cases, two of which were mentioned in a previous paper, and worthy of repetition on account of their prolonged chronicity.

Dr. L. J., age 42 years, a dentist, was referred to me by a prominent aurist, on account of a recurrent suppuration of the right ear of 35 years' duration. He had been seen by three different colleagues, all of whom advised radical surgery. The hearing was good, 10 feet for ordinary voice, and three feet for whisper. Pain on top of the head, and occasionally bleeding from the ear, when the pain was relieved, were distinctive symptoms. The secretion was odorous and of an intermittent type. The fistula was negative. The X-ray photo showed no disintegration of the mastoid cells. The patient had suffered from attacks of vertigo. This history was rather a dubious one for conservative treatment. As the patient objected seriously to radical surgery, he was advised that if any fulminating symptoms arose, such would have to be performed for relief and safety.

On examination a large perforation of the posterior half of the membrana, including Schrapnell's membrane, was seen. Considerable secretion was present and the patient informed me that he cleaned the ear twice daily for years. Gentle suction by means of a cannula was applied to remove the secretion, which brought into view a good sized polyp occupying the posterior attic space. This pathology accounted for the intermittent headache, vertigo and occasional bleeding. After removal of the polyp and granulation tissue during the course of treatment, plus the application of the iodine powder (Sulzberger), the ear became dry in two months. No further vertigo or headaches were experienced. It was surprising to see the perforation grow smaller after so long a suppurative process. The hearing was markedly improved.

The second case occurred in one of my house staff at Lebanon Hospital. Dr. L., age 25 years, had suffered from chronic suppuration for 24 years, following convulsions as an infant. He had continuous treatment for many years, which did not succeed in drying the ear. Syringing of the ear at home caused dizziness, but he had no pain. Impaired hearing was annoying. Suppuration increased with acute upper respiratory infection. Daily douching for many years was carried out. Having observed the pleasant results in some of the hospital cases on my service, he requested treatment. After removal of a small polyp from a central perforation, and the use of a 1 per cent powder, the ear was dry after three treatments, much to our mutual surprise. Application of trichloracetic acid to the edges of the perforation stimulated epithelial proliferation, though the perforation was not entirely healed over. Hearing was much improved.

The following brief history demonstrates what can be accomplished with conservative treatment, even though a rather unpromising picture is presented.

Mr. C. G., age 27 years. History of yellowish-greenish discharge with odor from left ear, for over 25 years' duration. Vertigo on douching or cleansing with cotton. Marked deafness. Headaches periodically twice weekly. When climbing a ladder gets dizzy. Urine analysis negative. The day he consulted me he was to go to the hospital for a radical operation at the advice of his former aurist.

Examination showed considerable secretion in the middle ear, with practically the entire membrane absorbed. Absence of malleus and incus. A fair-sized polyp attached to the posterior canal wall at the periphery of the drum remnant, with granuloma along the hypotympanic area. Cholesteatoma occupied the attic region. Not a very hopeful outlook for conservative treatment.

I informed the patient that the indications for radical surgery were present, but as long as no active symptoms appeared, I was willing to try the conservative treatment, with the understanding that the operation must be performed if symptoms arose that demanded intervention.

At the first visit most of the presenting pathology was removed under local anesthesia. The attic was thoroughly

cleansed of cholesteatoma and, after hemostasis, the entire middle ear was filled with a 5 per cent iodine powder (Sulzberger). Daily dry treatments were given for 10 days, each time the attic, hypotympanic space and Eustachian area were cleaned and dried. In two and one-half months this unpromising looking ear was dry with useful auditory function.

Mr. E. G., age 42 years, referred by another aurist, to test the merits of iodine powder (Sulzberger) before radical surgery was attempted. History of odorous secretion for 15 years, at times bloody. Had growth removed two years previously. Hearing much lowered. No general symptoms. Radical surgery advised by other aurists. Examination revealed large perforation in posterosuperior quadrant, with purulent secretion, debris and cholesteatoma and granuloma filling the upper middle ear and attic region. Hearing was much lowered to ordinary voice. It took considerable time to cleanse the ear before the 2 per cent powder was insufflated. Patient was very stoic and permitted prolonged manipulation to remove the contents of the middle ear and attic spaces. Regular treatment was carried out on alternate days until the secretion lessened, when the visits were reduced to biweekly. Treatments were given for five months at longer intervals before the ear was dry with fair hearing.

S. B., female, age 10½ years, referred to me with the following history: Three years ago had radical mastoid operation on left ear for odorous secretion of six years' duration, following whooping cough and measles. Two weeks later had lateral sinus and internal jugular operation.

Examination showed considerable greenish secretion, occupying an extensive radical cavity, with a large mass of cholesteatoma and debris. The young girl complained of headache off and on. No vestibular irritation, except on manipulation in posterosuperior region of middle ear. Auditory nerve responded to bone conduction. Fistula test negative. With the usual treatment of 2 per cent powder, the cavity became dry in three weeks. Three years later some secretion in the middle ear region. Small granular surface on upper rim of middle ear cavity. This area was gently curetted and surface cauterized with trichloracetic acid; application of 2 per cent powder with satisfactory result.

In all chronic suppurative cases occasional inspection should be made after the ear has become dry, so that any accumulated debris, ulceration or erosion may be detected and dry treatment instituted if necessary.

It is not my intention to prolong this paper by further clinical histories. Before closing I wish to mention that subacute suppuration frequently responds to this powder with prompt results.

My method of treating nasal infections is as follows:

The congestion of the mucous membrane should be reduced by diluted ephedrine or neosynephrine solution. The secretions should be removed by means of gentle suction and the nasal cavities then cleansed by some alkaline spray. A mild local anesthetic (1 per cent cocaine or 2 per cent novocaine or a 2 per cent pantocaine solution or 2 per cent larocaine) is then applied. After waiting a short time the weak (1 per cent) iodine powder (Sulzberger) is insufflated in the region of the meatus covering the anterior portion of the middle turbinal body, between the turbinal and outer wall, and turbinal and septum. The patient should be cautioned not to forcibly blow the nose for an hour after the application. Excessive secretion which will follow for a short time after the application of the powder may be wiped from the nose. If no anesthetic is employed, the powder may cause a smarting sensation which will pass away in a short time. The effects of prompt liberation of the free iodine is experienced by the patient in a few minutes. In persistent suppuration the 2 per cent powder should be used.

For irrigation purposes one or two tablespoonsfuls of the iodine powder (approximately 2 per cent) should be placed in a pint of lukewarm sterile water and the bottle thoroughly shaken before same is used. Personally, I have employed the powder in its dry form, as previously mentioned.

In atrophic rhinitis the dried secretion should be removed and the strong powder may be insufflated in the manner suggested.

In a paper, "A New Method of Treating Suppurative Disease of the Nasal Sinuses,"⁸ Dr. Walter A. Wells, of Washington, D. C., mentioned that in a study made with the new highly vaunted modern antiseptics, Miller and Appleton

(Dental Cosmos, 1931) came to the conclusion that iodine was of all the most efficacious. They employed a solution of not higher than 2 per cent as the official tincture of U. S. P. was too concentrated and, therefore, irritating to the membrane. He further remarks "if the molecules of iodine can be brought in contact with the diseased tissue, in their nascent state, its therapeutic value is tremendously increased.

Dr. Wells courteously refers to my experience with iodine powder (Sulzberger) and further states that the success obtained by me was his inspiration, to attempt something similar in suppurative disease of the sinuses. He hastens the liberation of iodine from a combination powder by an electric heater. Geo. J. Pilling and Son Co., of Philadelphia, has placed upon the market a simple and effective instrument for volatilizing iodine powder.

My method of permitting the body heat to volatilize the iodine is very satisfactory, so that the penetrating effect of the free iodine continues as long as any of the powder remains in contact with the mucous membrane. I have used this simple method for many years with satisfactory results and I find no need to employ complicated electrical apparatus, as the temperature of the nasal cavity is an effective volatilizer.

In a communication dated May 8, 1933, from the late Dr. Edward F. Ziegelman, of San Francisco, he informed me that he had been using the Sulzberger powder for some time in conjunction with conservative sinus surgery and had most excellent results. He felt that by its use he obtained surgical drainage and chemotherapy. From a very extensive general surgical practice, in command of a surgical team in France, and in private practice, he was convinced that the halogens to which group iodine belongs have not been sufficiently appreciated by many in the profession, in the treatment of infection.

The action of the powder is generally very prompt and for some time after its application considerable mucoid secretion appears. After the hygroscopic effect has ceased, the breathing space in the nares is increased and the patient feels more comfortable. Home treatment can be carried out by permitting the patient to reduce the tumefaction of the swollen tissues with a weak solution of neosynephrine or ephedrine, or two or three sniffs of the benzedrine inhaler which in some

cases acts very promptly. In sensitive patients a weak local anesthetic may be sprayed into the nasal chambers before the powder is snuffed.

If there is much purulent secretion, the Nichols or Simplex nasal syphon assists materially in its removal. After the nose is cleared, the weak powder is gently snuffed up into the nose. The patient should inhale the powder as though he were smelling a flower, with one nostril closed. In this manner the current of air passes upward towards the middle meatus. Home treatment may be employed twice daily if the secretion is very profuse.

It is not my intention to offer this antiseptic powder as a panacea, but in addition to its effectiveness in aural and nasal infections, and because of the prompt liberation of iodine on contact with heat and moisture, there are numerous other indications for its application: A surgeon who is using the powder in cases of localized chronic osteomyelitis, in which a small sinus exists, informed me the powder had a distinct drying effect with marked diminution of the discharge. A personal communication from another surgeon states that he was employing the powder in several cases of carcinoma of the lower bowel and that it seemed to him that it reduced the sloughing and erosion.

A prominent gynecologist, of New York, sent me the following report of his experience: "I had occasion to use iodine powder (weak) in several cases of obstinate vaginitis and also for abdominal wound sinuses with gratifying results. The discharge disappeared rapidly in vaginitis and in the cases of the abdominal wounds healing appeared to be more rapid."

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106 East 84th Street.

A FOREIGN BODY IN THE EXTERNAL AUDITORY CANAL TRAPPED BY EXOSTOSIS.*

DR. H. J. HARA, Los Angeles.

Foreign bodies in the external auditory meatus are frequently met in the practice of otology. Exostosis of the same region is not rare. A foreign body, however, which is trapped mesially to an exostosis of the auditory canal for a period of from eight to 13 years, belongs to the realm of medical curiosity.

Holtz¹ reported a case in which a watermelon seed was caught beneath an aural polyp in a boy, age 8 years. The polyp was removed with a wire snare and the foreign body was discovered the next day when the cotton plug was removed from the canal. Hilton² recorded the case of a boy, age 13 years, in whose right external auditory canal the rubber end of a pencil was lodged for four years. A large polyp blocked the otoscopic view. Radical mastoidectomy was done and during the course of surgical manipulation the foreign body was discovered and removed.

REPORT OF A CASE.

A well developed but poorly nourished American-born housewife, age 23 years, was first seen in my service at the White Memorial Dispensary, Los Angeles, July 23, 1936. She complained of a dull aching pain in the right ear which began about three months before and became progressively worse. Recently this sensation of dull ache had changed to an intermittent, lancinating and throbbing pain, radiating upward along the right temple. It was so excruciating at times that it wakened her at night, and during the past two weeks she had not been able to do any housework. For the past three months a snapping sound in the right ear was noticed which was accentuated on moving the head to either side. During this same period the acuity of hearing on the right was considerably reduced, and for about three weeks she invari-

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ably turned her head in order to use the left ear during conversation. With the exception of occasional attacks of tonsillitis and colds, the patient's general health had always been good. She lived an active life and this was her first experience of any auditory symptoms.

Examination showed the left concha to be normal in appearance. The external auditory canal was smooth and the mem-

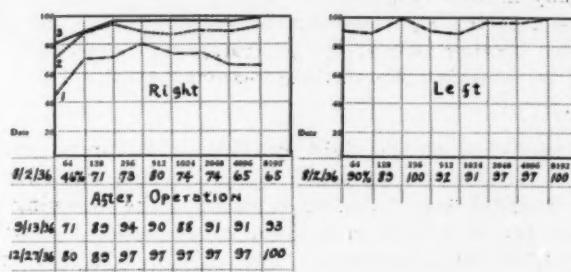


Fig. 1. Results of hearing tests with the Jones-Knudsen audioamplifier before and after operation.

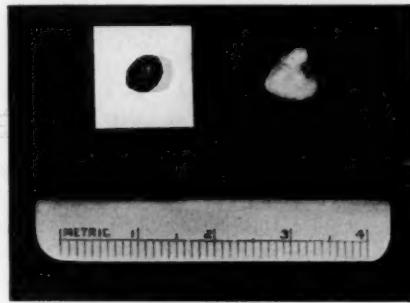


Fig. 2. Bony tumor and foreign body.

brana tympanum showed no abnormality. The right concha was normal but the external canal was completely occluded by a large, hard, pearly white, osseous growth, covered with thin, shiny skin, just within the bony portion. Whether the tumor was pedunculated or sessile could not be determined by otoscopic examination. The Eustachian tubes were patent. Roentgenograms showed well developed pneumatized mastoid cells on each side. Functional hearing tests showed typical

obstructive deafness on the right, while the left was normal. Fig. 1 shows results of hearing tests with the Jones-Knudsen audioamplifier before and after the operation. Before the operation her upper tone limit on the right was 13,000 double vibrations; after the operation this was raised to 17,000 double vibrations, the same as in her good ear. The bone conduction on the right with 256 tuning fork was +5 seconds, as compared with that of the examiner, which is 25 seconds. The labyrinthine response on turning was normal; turning 10 times to the right the nystagmus to the left lasted 26 seconds; turning to the left the nystagmus to the right also lasted 26 seconds. For obvious reasons no caloric test was made.

An operation on the right external canal for removal of the bony growth was proposed and the patient was admitted to the hospital Aug. 2 and operated upon the following day. On the day of admission a blood count showed: Erythrocytes, 4,550,000; leukocytes, 7,750; lymphocytes, 34; polymorphonuclears, 63; monocytes, 2; and eosinophiles, 1. Blood Wassermann was negative. Blood pressure was 154/100. Weight was 106 pounds (48 kg.) and height 5 ft. 6 in. (167.6 cm.). The urine was negative for albumen, sugar and blood.

Ether and gas anesthesia was used. A retroauricular incision was made as in the case of simple mastoidectomy. The auricle was pulled forward and the periosteum lifted from its attachment over the posterior canal wall. It soon became apparent that the tumor was attached by a thin pedicle to the upper wall immediately anterior to the spine of Henle. With a gentle tap of the mallet the growth was dislodged and delivered out of the canal. It measured 6 mm. in its greatest diameter. Upon close inspection of the deeper portion of the canal, a small, black, round object, not unlike a mass of dried cerumen, was noticed. This was seized with a small ear forceps and found to be the seed of a fruit, the variety of which was not determined. It measured 5 mm. in diameter. Fig. 2 shows the bony tumor and the foreign body.

Convalescence was uneventful and the patient was discharged from the hospital on the fifth postoperative day. She was seen every day during the following week in the clinic. Five weeks after the operation, on Sept. 9, her right ear was

Rinné negative, but the hearing was much improved. On Dec. 27 she was again examined, and Rinné was found to be positive and hearing function normal in each ear (see Fig. 1).

The origin of the foreign body was interesting. The patient was born and lived until 10 years of age in Chicago and then moved to Wisconsin, where she lived until 16 years of age. It was in Wisconsin that the fruit seed became lodged in her ear. It was probably that of the wild cherry which grows abundantly in that region. The snapping sound, which was so annoying at times, was probably the movement of the dried seed. The growth and development of the osseous tumor is a matter of conjecture.

DISCUSSION.

An exostosis may be congenital or acquired, sessile or pedunculated. When the base of the tumor is flat the condition is called hyperostosis.³ Gleason⁴ believes that in most instances hyperostosis is congenital while exostosis is inflammatory in origin. Moos⁵ considers the growth to be a mal-development as the result of pathological irritation during infancy. The neoplasm may be cancellous or of ivory hardness. It may be single or multiple and occur in any portion of the canal. The usual site is on the upper wall of the canal immediately in front of the drum.⁶ Koerner⁷ has found 147 cases of which 114 were in men and 33 in women. Bezold's⁸ statistics show the proportion 11 males to one female and found in .06 to 1 per cent of all ear patients in Germany. Koerner found them in 3.8 per cent of his patients, and they are said to be even more frequently met in Great Britain. Sir William Dalby⁹ believes heredity to be a factor. He reports such growth in two brothers whose father had a similar tumor. He also is of the opinion that some are congenital in origin and remain quiescent for many years. Bezold states that these growths never develop before puberty. Toynbee¹⁰ attaches great importance to the existence of syphilis, rheumatism and a gouty diathesis. Turner holds a similar view, that exostosis is more frequently met with in gouty subjects. In the light of our present knowledge, however, there is no clinical evidence to support their claim. Ballenger¹¹ mentions circumscribed periostitis as the result of traumatic fracture of the canal being one of the contributing factors. Beck¹² states that exostosis is frequently met in connection with

a fistulous formation within the canal secondary to chronic mastoiditis, especially in tuberculous processes. Frequent sea bathing, particularly among the natives of Hawaii, Peru and Mexico has been mentioned as a factor. George Jackson¹³ has examined all the skulls in the museum of the Royal College of Surgeons in which the presence of exostosis was noted. They were all from places near the sea. Among them were 12 from Peru, four from Chatham Islands, two from Fijian Islands, one from New South Wales, Australia, one from Isle of Pines, New Caledonia, and two from North America. Of the 450 skulls from North and South America, 25 had exostosis. No exostosis was noted in any of the skulls from other places. Glatt¹⁴ advances a theory that in the formation of the external auditory canal, in which the annulus tympanicus, squama and petrous portions of the temporal bones meet, certain portions may show a predisposition for overgrowth, thereby resulting in an exostosis. Hays¹⁵ voices the opinion of the majority of more recent American writers^{16, 17, 18} on the subject when he states that "no particular, definite causative factors have been found for these growths." Hrdlicka¹⁹ summarizes perhaps the most recent views when he states that "the paramount systemic cause appears to be a deranged neurovascular control of the parts involved . . . during what corresponds to the sexually more active part of life. . . The exciting cause of such exostoses, when the predisposition to these exists, may be anything mechanical or chemical that produces prolonged irritation, with consequent hyperemia progressing to inflammation, of any part of the bony meatus."

The surgical management of the pedunculated form presents no difficulty and the end-result is most gratifying, as in the case herein reported. The sessile form presents a much more serious outlook. As a rule neoplasms situated near the external orifice, or pedunculated ones located in the deeper part of the canal, are managed best through the natural passage under local anesthesia. The deeply seated, sessile growth is much more easily and thoroughly ablated by retroauricular approach, lifting the auricle forward and exposing the tumor under general anesthesia. For the removal of the growth some use a gouge and others prefer an electric burr. Muncaster²⁰ recommends a notched saw, made of No. 1 piano wire, for the pedunculated form of growth. Whatever approach is made, or whatever form of surgical instrument is used, the

operation *per se* is not difficult but its aftercare is tedious and time consuming. Formation of atresia is a troublesome complication. A large number of cases of exostosis of the external auditory canal do not call for any form of treatment. This is particularly true of multiple exostosis. The operation should be undertaken only when the canal is completely occluded, causing inflammation and increasing discomfort, or in a case of threatened mastoiditis in the presence of chronic suppurative otitis.^{21, 22, 23}

In two of my recent cases, one complicated with chronic suppurative otitis media in the presence of threatened mastoiditis, and the other with marked reduction in hearing and complete occlusion of the canal, surgical intervention was done, but both took weeks of aftercare in order to prevent atresia of the canal. Fortunately, both have fully recovered and now have normal hearing. Page²⁴ warns that "one has but to attempt this operation to discover the difficulties of its after treatment and the almost inevitable disappointment that results." When surgery is absolutely indicated, Page recommends the modified radical operation with complete exenteration of the mastoid cells.

SUMMARY.

1. A case of exostosis of external auditory canal, in which a seed of wild cherry was trapped for an interval of from eight to 13 years, is presented.
2. Surgical removal of the tumor is indicated only in the case of threatened mastoiditis in the presence of suppurative otitis media, or when the tumor completely occludes the canal and greatly impairs hearing.
3. A single osseous growth with sessile base which permits the passage of a probe, or multiple tumors which produce no symptoms, are better left untouched.

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NEW YORK ACADEMY OF MEDICINE.

SECTION OF OTO-LARYNGOLOGY.

Meeting of Nov. 18, 1936.

Basic Pathological Anatomy and Histopathology in Oto-laryngology (presentations by lantern slides and microprojector).

Nose. Dr. Andrew A. Eggston, New York.

The basic pathology underlying the infectious diseases of the nasal passages and accessory sinuses has been unfortunately greatly neglected by general pathologists and histologists. So much so that medical students even today receive the most perfunctory and smattering instructions of the gross and histopathology of the mucus membranes of the upper respiratory tract. This is so appallingly true that in many instances recent graduates of medical schools and alumnae of many hospitals, who by choice wish to specialize in otolaryngology, in many instances hardly have had references made to the basic and fundamental structure and function of the membranes in the nose, when they begin their internship in this specialty. General pathologists, and I plead guilty of this impeachment, in the past have paid entirely too little attention to the study of surgical pathology and autopsy tissues of the upper respiratory and otological structures.

Gratitude may be expressed, however, to the leading otolaryngologist for requiring in recent years an intimate knowledge and to pass a satisfactory examination of the underlying principles of the physiology and pathology of the specialty before the applicants can be certified before the American Board of Otolaryngology. Already productive of a study of nasal structures has been a better understanding of the pathways to intracranial infections, such as the infectious agents of infantile paralysis, encephalitis, lethargica, meningococcus meningitis, and likewise in some instances of streptococcus infections of the intracranial structures. This knowledge has been effectively applied in the prophylaxis of these tropical diseases.

In addition a useful and much needed understanding of the underlying mechanisms of the pathological changes has resulted from a study and classification of the pathological changes in the tissues of the nasal passage from chronic and repeated infections of the mucus membranes of the accessory nasal chambers. It has been my privilege to study to a considerable degree these changes, and I will review briefly some of them.

Lantern slides illustrating: 1. Hypertrophic or polypoid sinusitis is characterized by thickened and edematous changes in the mucous membrane and periosteum, and is usually associated with polypoid masses of the soft tissue and rarefaction and osteoporosis of the bone. 2. Atrophic, fibrotic, sclerotic and arteriosclerotic sinusitis is characterized by an increase in the fibrous connective tissue in the stroma, thinning of the mucous membrane and metaplasia of the surface epithelium, associated with thickening of the periosteum and a condensing osteitis. 3. Bony changes incident to chronic sinusitis. 4. Tuberculosis, syphilis, rhinoscleroma, etc. 5. Some interesting tumors.

These are only a few of the interesting phases in nasopharyngeal pathology. Practically an unexplored field for research. In so brief a period no reference could be made to the many interesting phases of the chronic specific infections found in this region, likewise the complex problems of allergy must some day be solved by a national study of nasal physiology and pathology to the general manifestations of these syndromes. Further neoplastic diseases of these struc-

tures offer a veritable bonanza of research material equaled by no other field of pathology. A more general appreciation of these basic principles, coupled with the excellent surgical skill already available, will elevate the specialty of otorhinolaryngology from one frequently considered as a secondary one to a rightful position of primary importance.

Ear. Dr. Edmund Prince Fowler, Jr.

This paper was an outline of the common conditions of the ear with a discussion showing a series of lantern slides and actual preparations by micro-projections.

The common types of congenital anomalies were first shown with emphasis on the malformations due to the improper closure of the bronchial clefts and bronchial pouches, as well as irregularities in the growth of the otic vesicle. Fungus infections of the external and middle ear were mentioned and a few sections of nonmalignant tumors, hemangioma, granulomata and polyps were shown. A brief discussion of pseudo cholesteomata and true cholesteomata followed and it was pointed out that the true cholesteomata, such as those found in other parts of the skull, are very rarely, if ever, present in the temporal bone. It has been very clearly shown by Wittmaack and others that the pseudo cholesteomata are due to an ingrowth of skin from the external canal. The stratified squamous epithelium can be traced through marginal perforations in the drum. The cheesy and foul material usually sent to the laboratory for diagnosis in these cases consists only of the desquamated keratin layers of this epithelium and is quite similar to the desquamated keratin often found elsewhere in the body.

"Sagging of the posterior superior wall" was discussed and a section projected upon the screen, showing a perforation of the bony external auditory meatus and the abscess beneath the skin which produced the sagging near the drum.

A series of slides of tumors within the internal auditory meatus (see THE LARYNGOSCOPE, xlvi, 616, 1936, "Acoustic Tumors Within the Internal Auditory Meatus.") was shown followed by a group of slides showing hemorrhages and meningitic infiltrations of the auditory, facial and vestibular nerves. A group of high-tone loss cases was then demonstrated with a discussion of the etiology of arteriosclerosis, loud noise, quinine, tobacco and other drugs, as well as experimental work in the placing of chemicals and bacteria toxins on the round window (see Ann. Otol., Rhinol. and Laryngol., 45, 859, 1936, "End-organ Deafness in Dogs Due to the Application of Certain Chemicals to the Round Window Membrane.").

Spontaneous fractures, such as those described by Nager, Guild and others, were taken up and several lantern slides shown and the question of whether they might not be responsible for certain types of nerve deafness discussed.

The question of whether these fractures were responsible for otosclerosis as suggested by Otto Mayer was considered, as were the otosclerosis theories of Wittmaack, Bruhl, Fraser and E. P. Fowler, Sr. The finer histology of otosclerosis and Paget's disease was shown.

The nomenclature of otitis media was taken up and, using pathological specimens as examples, the term O.M.C.C. condemned. All types of inflammations of the middle ear from the mildest, so-called nonsuppurative type to the most severe suppurative type and nonhealing processes, showing the transition from edematous fibroblastic tissue to dense scar tissue, were demonstrated. Deafness was shown to be produced by the location of the scar tissue.

Inflammation of the air cells of the mastoid and petrosa were shown to be more or less inevitable in every case of otitis media. Inflammation of the petrosa was shown to be inevitable in pneumatized petrous pyramid. Inflammation in the marrow of the petrous pyramid or mastoid was shown to be a very common concomitant to osteitis of the pneumatized portions of the bone,

in fact it was suggested that many chronic otitis medias are due to chronic osteomyelitis of the petrous portion of the temporal bone or chronic osteomyelitis of the petrous portion of the temporal bone or chronic osteomyelitis of a nonpneumatized mastoid, rather than inflammation of the poorly draining air cells as is generally supposed. A parallel was drawn between the symptomatology and course of chronic otitis media and osteomyelitis of the long bones of the body. It was suggested that particularly the chronic running ears following adequate radical mastoidectomy seemed to be due to osteomyelitis, both in pathological specimens and X-rays.

The known pathways of infection of the meninges were demonstrated. The routes shown were: The breakage of the petrous cells into the carotid canal; the direct breakage into the internal auditory meatus or the posterior fossa from an infracarotid group of cells, or breakage into the inner fossa from a supracarotid group of cells. Labyrinthitis and meningitis were shown to often come from petrous inflammation.

A few sections of thrombosis of the wall of the lateral sinus were shown. Finally, in closing it was emphasized that complications of infections in the ear were almost invariably due to shutting off of portions of the temporal bone by previous inflammatory processes. Laminae of new bone, each representing a new infection, were pointed out and it was demonstrated that this bone could build up in a normal outlet in such a way that slight infection could enter the cavity but would be unable to drain out because of the subsequent swelling of the mucous membrane, which would naturally completely wall off a narrow opening. Exudates trapped in such a cavity often break through into vital structures instead of draining through their normal channels.

DISCUSSION.

DR. ISADORE FRIESNER: I am not going to keep you very long, but I would like to ask your patience for just a minute or two while I reminisce. I remember 25 years or more ago, when John Kernan was a boy just out of his internship at Presbyterian Hospital, when Andy Eggston was still a wild youth wandering around in Mount Vernon, when Ed Fowler was yet unborn, when you might search the city of New York in all its hospitals and even its medical schools and not find the amount of material that these three men alone have filled our evening with tonight. I remember when Alfred Braun and I were assistant surgeons at the Manhattan Eye and Ear Hospital and we had the desire to become a little more intimately acquainted with the organ with which we were dealing. We went to the laboratory and Sam Richardson, the technician at the Manhattan, taught us how to fix, decalcify, mount and cut the specimens which we made, and we worked afternoons and nights at that job for a number of years. I was considered a boy marvel because, not ever having had any training in histology abroad, I had seen and studied and knew the histology and some of the histopathology of the ear. From that we have come to this, the thing that was presented tonight, in which a few men have enough material to overfill an evening. I dare say you could go to any Grade A hospital in the larger centers of America today where they have an active pathological department and find a museum of pathological specimens with slides and even lantern slides illustrative of the various conditions that have been presented here. Of course, to those of us who have lived 60 years, it is not any more remarkable than the development of the automobile, the aeroplane, the telephone, the radio and those other marvelous things which we have seen in our lifetime. However, I quite agree with Dr. Eggston that the specialty of laryngology and otology will be put on a much higher plane, the more we give evidence of our interest in the histopathology of the organ with which we are dealing. For years we have been in the position of the watchmaker who would be asked to repair a watch and who has never had the opportunity of taking a watch apart. That in America has gone and I believe that although we have lagged far behind the general pathologist, yet our advance in the last 25 years has more than kept pace with the pathology of any other branch of medicine.

I have asked Dr. Druss to present most of the lantern slides of suppurative lesions which we have in the laboratory. I have reserved for myself only two. The first slide illustrates deaf mutism. It is a perfectly normal middle ear. This child at 2 years of age had epidemic meningitis, and this newly formed bone replaced the normal structures of the labyrinth. At 15 she developed pneumonia from which she died. The second slide shows not a vestige of space in the cochlea, let alone an end organ.

The reason I show you this is the following. This history is that this child had 20 per cent of hearing in one ear and 30 per cent in the other. She was examined by an audiometer, but by a technician. So, if you use the audiometer, use it yourself.

Just one thing more about Dr. Fowler's presentation. In an article by Brunner on sagging of the posterior canal wall, he showed canal walls like those Dr. Fowler presented, with this exception: the cells had no gross connection with the antrum. I believe this is correct, but I am not sure as it is a long time since I read this article.

DR. MARVIN F. JONES: To most of us who are not as well versed in the pathological processes as some of those who have been here tonight, I want to offer a condolence. I have had the pleasure of being in Baltimore and various other places and have heard various pathologists seated at a round table and found a thing which is very common. One pathologist will say one thing, the second will contradict it, a third will side with one or the other of them, and before the end of the evening they find themselves in a considerable discussion. The pathology of the ear and nose and throat is considerably in its infancy and I would respectfully suggest that Dr. Fowler follow a procedure I have followed for years. It is the reverse of the custom followed in Hollywood of having a "Yes" man. I would suggest he get a professional "No" man. Dr. Hemsath worked with me for a long time. I would suggest something that looked to me very logical and get very flowery about some idea. Hemsath would say, "No. That is not so." He made it a point always to say "No" when I said "Yes." A governing wheel is a very good thing and to make haste slowly allows the ground to be much better established. I do not know if there is anyone in New York who knows more about ear pathology than Ed Fowler. I admire his courage. He wanted to stir up a discussion. In order to do that, I should have to use the rest of the evening, because practically all of the later points he presented are highly controversial. Some day I would like to get him in a quiet corner and discuss this with him.

I do not know of an evening I have ever spent at the Academy that has been more instructive or more interesting.

DR. JOSEPH G. DRUSS: I, too, wish to express my thanks and offer congratulations to Dr. Eggston, Dr. Kieran and Dr. Fowler for presenting so beautifully this evening. I can appreciate this type of work, having done it at the Mt. Sinai Hospital for the past eight years, particularly in the phase of otology. We have procured over 250 temporal bones and have now completed serial sections of each, and there are a large number of temporal bones still in process of preparation. May I burden you a little while longer with some histological sections of otologic interest. I will just take up some of the conditions that have not been discussed tonight.

The first slide shows an acute middle ear suppuration with a granuloma on the drum. It is a granuloma such as this which later on may contract and can be seen otoscopically as a scar or as a calcareous deposit.

The second slide demonstrates an almost identical picture as Dr. Fowler showed, of sagging of the posterior canal wall. There is tremendous thickening of the epidermis with separation from the canal wall. In this case there was no communication of an abscess between the external canal and the antrum.

The third slide shows a case of a chronic adhesive process in the tympanum. You will note the marked amount of scarring within the tympanum and the close approximation of the tympanic membrane to the promontory.

The fourth is an interesting slide which shows the infection travelling from the hypotympanum to the jugular bulb with marked necrosis of the jugular dome. You will note that the infectious process is continuous from the tympanum to the jugular bulb, the jugular dome having been destroyed in part, with a resultant phlebitis and thrombosis of the jugular bulb.

The fifth slide is one of a case of tuberculosis, a disease mentioned by all three speakers. This is in the tympanum. You will observe the small tubercles in the submucosal region and a sequestrum of bone. An interesting feature of this case is that through a perforation of the drum the epidermis has grown in and has lined the inner tympanic wall.

The sixth slide is of a case of otosclerosis. I do not want to spend any time on this slide. Dr. Fowler brought out the salient features in this condition. There was no ankylosis in this case. An interesting feature is that this patient was 63 years old and had symptoms for only about three years.

The seventh slide is of a case of fistula into the external semicircular canal. I bring this up to serve one purpose. Note the organized granulation tissue about the fistula. It is a protective mechanism. The point I wish to stress is that although it is the common belief that at operation it is extremely difficult to traumatize the bony capsule, particularly in adults, I feel that this is not always true and that it is possible with instrumentation to injure the bony capsule. I have seen in one or two cases where, as a result of too vigorous manipulation with a curette, this condition was found. I do not say that that was the case in this particular instance. Indiscriminate use of the curette over the semicircular canal in cleaning out the antrum is not wise.

The eighth slide shows chronic middle ear suppuration with labyrinthitis and a primary bulb thrombosis in the same case. This patient was admitted with signs of meningitis and there was no chance of saving him. The slide shows a labyrinthitis in the external, superior and posterior semicircular canals. If you will center your attention on the region of the bulb you will note a fistula in the posterior semicircular canal. Dr. Fowler mentioned the possibility of a petrous pyramid suppuration as causing a labyrinthitis, and labyrinthitis causing meningitis. In this case I also had difficulty in determining whether or not the fistula and the labyrinthitis resulted from periphlebitis or whether the labyrinthitis was primary and the periphlebitis secondary. We know definitely that a fistula can be either centripetal, i. e., produced from outside in, or centrifugal, from within the labyrinth out. In this case the labyrinthitis was probably secondary to the peribulbar abscess. In other words, the fistula was centripetal in nature, i. e., from without inward.

The ninth slide shows a cholesteatoma in the aditus and antrum which had entered through a marginal perforation in the drum. This is not a true cholesteatoma, but one which was produced secondary to an infection in the tympanum by the invagination of epidermis along the margins of the perforation. It is therefore a secondary cholesteatoma.

The tenth slide shows a carcinoma of the tympanum and the petrous pyramid. You will see here that the tympanic cavity is replaced by carcinomatous tissue, infiltrating the labyrinthine capsule and the labyrinth through the oval window, displacing the footplate of the stapes and causing a labyrinthitis. The patient had a chronic middle ear suppuration for 18 years with acute symptoms for two weeks and was finally operated on. A tremendous involvement of carcinomatous infiltration throughout the temporal bone was found at operation.

I wish again to thank the speakers for the privilege of discussing the papers.

DR. RUDOLPH KRAMER: This has been a tremendously instructive evening and it has been a great pleasure to me to be here. Unfortunately, the hour is getting late and I do not want to keep you here very long. Dr. Fowler asked me to confine my discussion to a specific subject. We have been particularly interested in the infections of the sphenoid, both from the clinical and from the therapeutic aspects. Dr. Som, a member of my staff, and I have studied

this subject at the Mt. Sinai Hospital and we have found some very interesting illustrations of the pathways of infection from the nasal sinuses to the intracranial contents. To my surprise, in looking up this subject, every textbook that I have consulted says that there are certain modes of infection of the intracranial contents from the sinuses. However, except for thrombophlebitis, I have not been able to find quoted any confirmation of these theoretical pathways. I want to show you a few slides of some of the material which we have studied.

DR. FREDERICK M. LAW: After such a magnificent demonstration as we have had tonight, it seems silly to try to correlate the X-ray findings with what you have seen on the slides. In the few moments available, I will just mention two points which you might find of benefit in your reading of X-ray films, not films showing clouding of the cavities but films that show clear cavities. Dr. Eggston mentioned edema. That shows on the film. Picture the normal lining of a sinus. There is bone, periosteum and mucous membrane. The latter, of course, does not show on the film, but the others do. When you have edema of the mucous membrane, when it is water-logged and swollen to many times its original diameter, the lining of the cavity is fuzzy and merges into the remaining part of the cavity, so that you do not see a clear, sharp outline as in the normal sinus. Whether the edema is an acute process or polypoid, there is thickening and instead of a sharp outline due to bone, there is an irregular and fuzzy outline, although the cavity itself may be fairly clear. When you look at the films, do not consider so much the contents of the cavity, but look at the edges and walls and consider what the microscopic appearance should be to produce the picture. If you correlate it with what you have seen tonight, you will derive more information from your films.

NEW YORK ACADEMY OF MEDICINE.

SECTION OF OTO-LARYNGOLOGY.

Meeting of December 16, 1936.

Choice of Operation in Tonsillectomy. Dr. Jos. D. Kelly.

(Published in January, 1937, issue of THE LARYNGOSCOPE.)

The Results of 76,000 Adenoid and Tonsil Operations. Dr. Wm. H. Turnley.

(Published in January, 1937, issue of THE LARYNGOSCOPE.)

DISCUSSION.

DR. DAVID H. JONES: The tonsil clinic was quite a hobby with me. A number of years ago Dr. MacKenty attended a meeting of the Tri-Ological Society and the question of adenoidectomy and tonsillectomy came up. He was severely criticized about the way this operation was then being performed at the Manhattan Eye, Ear and Throat Hospital. The tonsil work was then reorganized into a separate Tonsil Clinic and our first problem was to obtain a history card on which we could record all the data we wish to know about our patients. This card has been improved and the one which we are now using gives us all that information (lantern slide demonstration). Dr. Turnley and Dr. Fisher examine the patients on admission, and under the heading, Subjective Symptoms, the various findings are checked. Under Objective Symptoms the condition of the tonsil as he sees it is checked. On the day of operation the patient is given a thorough physical examination by a member of the house staff; urine analysis, blood pressure and Wassermann, if necessary. At the time of operation the nurse in the operating room fills in on the history card the name of the operator, the anesthetist, anesthesia used, method of operation and duration of operation. The first duty of the anesthetist is to examine the mouth for loose teeth and these are extracted before operation. If any hemorrhage occurs it is recorded in its proper place on the card as to its location and method of checking same. Postoperative examination is made the next morning and again one week later. Each female patient is given a slip stating "Do not accept a date for operation five days prior to or during menstruation." This instruction slip, to my mind, has been of great assistance in preventing hemorrhage. Four years ago a physician was sent from another city to observe our work in this clinic and almost the first question he asked was, "What is your treatment of female patients during menstruation?" Our answer was, "We do not operate on them." It seems that there had been some rather bad results in his hospital, and in his opinion our ruling regarding this was worth his trip to New York. Our postoperative pulmonary complications have lessened very much since we have deanesthetized our patients with CO₂ and oxygen.

Dr. Kelly has given us a very clear and concise paper, but I do not agree with him regarding the use of the suture ligature. I feel that ligature of the bleeding point is all that is necessary in many cases.

DR. LEE M. HURD: Years ago every time they put in a new secretary and chairman of the Nose and Throat Section of the American Medical Association, I used to write them and tell them I wanted to read a paper on tonsils. I remember the time when all you had to do to start a riot was to read such a paper. The tonsil question will never be settled until some time when someone settles the question of what the tonsil is. There are three schools at present.

One school believes that it is a residual organ that ought to be taken out; the second that it is a lymphatic filter which protects the throat; and the third which thinks the tonsil is a blood-producing organ. You can take your choice. The indications for tonsillectomy run all the way from zero to 100 per cent removal by the man who takes out every tonsil he sees.

As to the question of when the tonsils are infected and when they should be removed, that is a question in which we have no foundation behind it to work on. There are one or two things I think which are essential. The size of the tonsil is of no account. The small, buried tonsil is, if anything, worse than the large tonsil. History counts for a lot. Glands in the neck are very important. Secondary anemia is very important, and the contents of the tonsillar crypts. Whether you squeeze them out or suck them out does not matter. It gives you an idea of what is in that tonsil.

As to the type of operation—the Sluder or the dissection method—the Sluder will do less damage to the surrounding muscle in the tonsillar fossa and will leave very often lymphoid tissue at the lower pole. The question is whether that is true tonsil or a lymphoid mass which connects up with the lingual tonsil. I don't know. However, there is less muscular distortion with the Sluder method. Take your choice. Do the one you can do best.

DR. WARD J. MACNEAL: I think the Section is to be congratulated on this program, particularly in regard to the work on the embryology and pathology of the tonsil. Everyone is anxious to know the difference between the pathological tonsil and the normal tonsil, as far as the human animal is concerned. I think the practical laryngologist recognizes as abnormal any tonsil he can find. Many people regard tonsillectomies with great enthusiasm and many believe it would be a great benefit to all if they were done on every individual before he reaches the age of 5 years. As far as I know, there is no veterinary who regards this as necessary in livestock. One wonders if this is a purely human trait or whether there is any other animal which would be so benefited. The value of tonsillectomy, as far as we know, is based entirely on clinical evidence. I am inclined to think that any child who has a tonsil 25 or 30 mm. in diameter on either side of the throat is better off with them out. They interfere with proper breathing and swallowing, in addition to absorption from them. Certainly the value of tonsillectomy becomes evident in the observation of the behavior of the child after these big tonsils are taken out. He goes ahead in school, gains in weight, becomes athletic, and his behavior makes all the other children want to line up for tonsillectomy.

As to the value of tonsillectomy for relieving people from other kinds of disorders, it certainly relieves many colds. One man said to me recently that having the tonsils out makes the children less of a nuisance to their parents. Relief from rheumatoid disease is a thing we hear about except in clinics for rheumatoid diseases where nearly every patient has already had his tonsils removed. The relationship to diseases of the bronchi and lungs is less evident.

As to the pathology, that is really a tough job. I am inclined to say that a tonsil is hypertrophied if it measures in any diameter more than 20 mm. and that it is also pathological if it shows any great firmness in its structure. Then you have distinct evidence of recurrent inflammation which has gone beyond the capsule and threatened other tissues in the neck, not to say all other tissues in the body. If you find thrombosis of the vessels in addition to the fibrosis at the base of the tonsil, you have evidence that here is the place where infection is going to recur and probably the patient will be better off with a surgical scar rather than the natural scar from the recurrent inflammation. Of course, we have very little opportunity to inspect such surgical scars in the laboratory except in the secondary tonsillectomy, when this scar tissue sometimes shows evidence of severe inflammatory changes. One wonders occasionally as to just what that scar tissue is which is left after the primary tonsillectomy. Years ago, whenever a patient had typhoid or tuberculosis or any other general disease, one believed it was due to infection from the tonsil. No one believes that now. Diphtheria has become almost extinct in

New York, as a result of tonsillectomies, probably! Of course, one still sees Vincent's angina of the tonsil. This is often confused with carcinoma of the tonsil because of the finding of spirilla in the ulcerations. Occasionally there is a gumma of the tonsil which is often diagnosed as Vincent's angina because the spirillum is present. The proper diagnosis of these conditions requires a proper evaluation of other evidence, rather than the finding of the microorganism on staining smears.

DR. ARTHUR NILSEN: There is much I would like to say, but I will confine my remarks to the Beck-Mueller tonsillectome. The original name is Beck-Mueller, and it should not be called Sluder-Beck as it resembles the Sluder instrument only in that it is a dislocation method. The original instrument has been modified by Schenk, Voislawsky and others, but the technique remains the same. The Sluder has a rigid, sharp or semisharp blade which passes from before backward, but the operating element in the Beck is a flexible wire loop and the operation is essentially one of blunt dissection from behind forward.

The Beck may not be the easiest instrument in the world to learn to use, but once the technique is mastered, it is infinitely simpler than dissection and there are only two types of tonsil in which it cannot be used with success if the operator becomes proficient. One is the tonsil so firmly adherent that it cannot be dislocated through the ring of any instrument. This type is rare in children and not so very frequent in adults if the instrument is properly applied and pressure properly used. The other type is the infrequent flat, thin tonsil lying on an unusually broad, thick posterior pillar with the anterior pillar very narrow. This often cannot be dislocated. Personally I cannot tell, until I have introduced the instrument and applied pressure on the anterior pillar, whether I can dislocate a given tonsil. Many of the buried, apparently adherent tonsils can be easily dislocated, and most of them yield if sufficient pressure is properly applied. But occasionally a tonsil which looks easily managed cannot be dislocated. If I fail to dislocate the tonsil properly through the ring, I do not pull up the wire but lay the Beck aside and resort to dissection, otherwise the wire is apt to cut through the tonsil and make dissection more difficult. I have no definite figures, but I believe the Beck can be successfully used in over 95 per cent of children. In adults the percentage is less because there are more adherent tonsils, but here I believe it is from 80 to 90 per cent.

DR. LUCILE V. MOORE: I believe every clinician has had repeated occasion to be pleased with the results obtained after tonsillectomy in cases where there have been frequent upper respiratory infections, such as tonsillitis, otitis, cervical adenitis and comparable illnesses. On the other hand, we know that having had a tonsillectomy does not insure a person's being free from these same diseases entirely thereafter. One of the most severe peritonissular abscesses I have seen occurred in a young woman who had had a tonsillectomy a number of years ago, and apparently not a complete one. It had been done in the middle west, not in New York. I have observed another severe pharyngitis in a young woman who had had one of the most perfect tonsillectomies I have ever seen. She had a very severe streptococcus throat infection, resulting in a lung abscess which resolved spontaneously. Again, all of us have observed numbers of patients who have survived childhood and early adulthood in excellent health with no history of respiratory difficulties and yet these patients present tonsils that look obviously diseased and like what we would call dangerous tonsils if they occurred in a patient giving a different history. I do not think we can generalize about these problems. Each patient is an individual problem for consultation between the internist and the otolaryngologist. However, it seems reasonable to say that persons who are subject to repeated upper respiratory infections, persons who have actual obstruction to the upper air passages by reason of large tonsils and adenoids, persons in whom systemic disease has obviously followed on an acute tonsillitis, such as acute glomerular nephritis and some types of muscle and joint involvement, it is reasonable to say that in such persons at the proper interval, tonsillectomy should be considered. I think there is a wide divergence of opinion among internists about tonsillectomy in rheumatism, especially in patients with rheumatic fever. Some go so far as to say that every rheumatic patient should have a tonsillectomy.

notably Kaiser of Rochester. Others feel that these patients should come under the same criteria as any other patient in whom tonsillectomy is considered. In other words, the history and type of acute respiratory infections should determine whether such patients should have a tonsillectomy. When the question of tonsillectomy comes up, I am often reminded of the answer given by the Kentucky mountaineer to a zealous health worker who insisted upon a tonsillectomy for his son, whose tonsils merely looked bad. He would only answer that the Lord gave them to him and there was nothing that would change his mind. That seems to me another way of saying that the tonsils are really part of a person. If they are giving trouble, removal should be considered and if not, probably removal should not be considered.

DR. CLARENCE H. SMITH: We have just heard an instructive and interesting review of the tonsil problem.

Dr. Kelly's analysis of the different types of operative tonsils is admirable, as is his selection of procedure.

As a general rule I remove children's tonsils by the Beck-Sluder method. Fifteen years ago Dr. Nilsen introduced me to the Beck-Sluder instrument and I have never since wavered in my loyalty to it.

I use dissection in the removal of tonsils in adults, and prefer local anesthesia, unless the patient is of the apprehensive type. This is because of the minimum amount of bleeding under local anesthesia.

I inject the anesthetic solution in only one spot for each tonsil, at the base and about where one visualizes the external surface of the gland to be. The quantity employed is 6 c.c. of $\frac{1}{2}$ of 1 per cent novocaine solution on each side. It acts as a block anesthesia.

Injecting the solution directly into a vein can be prevented by the withdrawal of the injecting needle a short distance from the first plunge into the tissues.

In tonsil dissection I try to be patient and painstaking in separating the outer pink or red layers of tissue from the capsule. The capsule when uncovered is unmistakable because of its glistening and white appearance. It took me a long time to really learn the value of this precaution. Previously I had not always thoroughly scraped off these over layers, with the result of much more bleeding and added difficulty in the operation.

Painting the pharynx with cocaine as a preliminary preoperative measure is dangerous. It tends to paralyze the swallowing function and if hemorrhage ensues the blood flows into the stomach unobserved.

Electrocoagulation may be a dangerous method of tonsil removal. A couple of days since I saw a patient who had been an invalid for two months. Her cervical glands were enormously enlarged on one side. The tonsil on that side was swollen and inflamed. Deglutition was painful. This condition followed a treatment of the tonsil with electrocoagulation. Apparently drainage from the tonsil had become blocked and retrograde infection ensued.

The so-called recurrent tonsil seen after a thorough tonsillectomy may be lymphoid tissue replaced by nature. Sometimes these lateral bands become chronically inflamed and require removal.

Pulmonary complications are uncommon in England. There, they enucleate the tonsils with the head extended by a sandbag under the shoulders, or they may operate with the head hanging over the end of the table.

The removal of tonsils in patients who suffer from attacks of rheumatic fever is a serious undertaking. It is possible to excite an acute attack from reinoculation of the raw postoperative spaces and thus seriously damage the heart.

A Further Study in Clinical Report of the Use of Acri-Violet in Diseases of the Upper Respiratory Tract and Ear. Dr. A. J. Herzog.

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MINNESOTA ACADEMY OF OPHTHALMOLOGY AND OTO-LARYNGOLOGY.

SECTION OF OTO-LARYNGOLOGY.

Meeting of Oct. 16, 1936.

DR. MATTHEW S. ERSNER read a paper on "Outstanding Signs and Symptoms in Sinus Thrombosis and Newer Concepts in the Therapy."

Abstract: Thrombosis of the lateral sinus as a complication of middle ear and mastoid suppuration never fails to produce mental aggravation whenever one is confronted with it. There is still a great deal of dispute relative to its management.

The profession apparently has divided itself into three groups; namely, those who always ligate the internal jugular, following the original dictates of Zaufal, Lane and Ballance; those who never ligate the jugular, as Mygind, Rott, Dixon and others; and those who classify each case individually. They attempt, by the use of their best surgical and medical judgment, to decide which cases should be ligated and which should be treated expectantly.

During the past two years we have had a series of 10 cases of lateral sinus involvement; this is in addition to a report of 14 cases recently presented by the writer.

The symptomatology of lateral sinus thrombosis may be divided into two groups: general and local. The general symptoms are temperature, chills, convulsions, proportionate pulse rate, mental picture, hematology, spinal fluid changes and metastasis to various parts of the body. The local signs and symptoms are centered about the external surface of the mastoid and the mastoid cavity, and vary with the type of mastoid, the condition of the lateral sinus and the internal jugular vein. Knowledge of the condition of these structures is elicited by inspection, palpation, ophthalmologic observations and various diagnostic tests.

The problem of the internal jugular vein: In the early part of this paper the author stated that there were three schools of thought relative to the surgical procedure of lateral sinus thrombosis. Although the surgical principle is simple and theoretically perfect, nevertheless ligation of the jugular vein has fallen short in many instances. Therefore, the efficacy of such a routine treatment is not entirely satisfactory and, from a therapeutic standpoint, ligation does not always solve the problem.

In sinus thrombosis, one is confronted with the following elements which must be overcome; namely, infection, septicemia, thrombosis (which may be the source of a local and focal infection), embolism and metastasis.

In combating the above, both medical and surgical therapeutic measures are utilized. The medical treatment consists of tonics, hematomics, repeated blood transfusions, chemotherapy, autogenous and stock vaccines, specific and non-specific sera.

The orthodox surgical treatment consists of the following: 1. Evacuation of the thrombus from the lateral sinus, if present, and the obliteration of the sinus by packing; 2. in phlebitis, the lateral sinus is merely incised and then obliterated; and 3. the third surgical principle deals with the ligation of the internal jugular vein.

The rationale for ligating the internal jugular vein is to obliterate the channel carrying the infection and thus check septicemia, bacteremia and, particularly, emboli and metastasis. One of the important factors overlooked was the collateral circulation through which infection still continues to enter the general circulation.

To substantiate this contention, the writer offers as proof the fact that 33 per cent of metastasis occurred after ligation and even higher percentages have been reported by other observers. In addition, the hospitalization period is not shortened and the mortality rate is often higher.

At the present time we practice phlebotomy of the internal jugular vein and lateral sinus. We do not disturb the clots either distally or proximally, as we believe that the thrombus is the result of the infection and is Nature's method of controlling it.

CONCLUSIONS.

1. Sinus thrombosis must be approached with an open mind.
2. Each case of sinus thrombosis is entitled to deliberate and deep consideration from a medical and surgical standpoint.
3. Thrombosis manifests itself in a variety of ways. The elements concerned in the causation and manifestation are so numerous that it becomes an impossibility to subscribe to one treatment.
4. The pathology, the virulence of the organism, and the resistance of the patient are factors which must be considered.

DISCUSSION.

DR. LAWRENCE R. BOIES opened the discussion of Dr. Ersner's paper.

Dr. Boies said this is a subject in which he had a special interest. He believed he could assure Dr. Ersner that all would approve of the conservative solution of these problems as he had outlined them; and added that there are still adherents to the view that all cases of sinus thrombophlebitis should have a jugular ligation, and those who believe that ligation need never be done. Dr. Boies believed that ligation has a place, but it is a procedure to be fitted to the special case rather than fitting the patient to the operation.

Lilly, in 1927, suggested a method of management which consists essentially of a thorough mastoidectomy first, with wide exposure of the diseased area of the sinus. This proved to be all that is necessary in some cases, in addition to supportive treatment with transfusions. If sepsis continued, however, the next step consisted of an investigation of the diseased sinus with incision for removal of the infected thrombus, and excision of as much of the diseased vein wall as seemed feasible. Jugular ligation is reserved for those cases in which sepsis continues, with evidence of a continued dispersal of infection into the blood stream.

Dr. Boies said he recently reviewed an experience with 300 consecutive mastoidectomies for acute surgical mastoiditis ("Extradural Inflammation: A Study of Its Occurrence in Acute Surgical Mastoiditis." Trans. American Academy of Ophthalmology and Otolaryngology, 1936) in which he had found that in 64 cases there was evidence that an infection had actually reached the sinus as indicated by injection or trophic changes or granulations. In 43 of these cases a complete mastoidectomy promptly effected a cure. The other 21 cases became definitely septic. Of these, 12 had jugular ligation. In the other nine, the more conservative procedure as outlined above was followed. Our mortality was 19.5 per cent (four cases) which approaches the good results reported by Lilly (13.5 per cent).

MINNESOTA ACADEMY OF OPHTHALMOLOGY AND OTO-LARYNGOLOGY.

SECTION OF OTO-LARYNGOLOGY.

Meeting of Nov. 13, 1936.

DR. FREDERICK A. FIGI read a paper on "Treatment of Angioma of the Face" and showed lantern slides of several cases both before and after treatment.

Summary: Radium is the most effective agent in the treatment of hemangioma of the face in a child. Electrocoagulation is the treatment of choice in many instances of cavernous hemangioma in an adult.

An angioma of the face previously treated unsuccessfully with irradiation is best excised, the wound then being closed primarily or covered with a skin graft.

The injection of sclerosing substances is becoming increasingly popular in the treatment of angiomas and, in the course of time, this method will probably supplant some of the older methods of therapy.

DISCUSSION.

DR. GEORGE C. DITTMAN asked if Dr. Figi made any distinction between electrocoagulation and fulguration.

DR. FIGI replied that fulguration is really electrocoagulation but the former term usually implies very superficial electrocoagulation. At the Mayo Clinic the terms electrocoagulation and diathermy are used interchangeably. Fulguration is usually carried out with a monopolar current, while diathermy implies the use of a bipolar current.

DR. E. R. BRAY asked how Dr. Figi would treat a deep red keloid scar.

DR. FIGI replied that this is an entirely different condition than the angiomas just discussed. Their preference at the Clinic has been to use radium treatment primarily in keloids, using ample protection and giving a comparatively small dose to the point of producing only an erythema; this repeated at intervals of about two months for three or four treatments. If there is not satisfactory response to this irradiation and the keloid is quite pronounced, electrocoagulation is used. This form of therapy would seem to be quite illogical but in many cases a thin soft pliable scar results following electrocoagulation of lesions of this type.

DR. HORACE NEWHART read the following resolution, which was adopted by the Academy:

WHEREAS, It has become known that many children of school age are the victims of impaired hearing which, in the earlier stages is frequently overlooked and, before the condition is recognized, often causes retardation in school work, speech defects and in some cases an inferiority complex, and, if neglected, may lead to a handicapping deafness later in life, and

WHEREAS, These conditions are far more prevalent in rural districts than in larger communities having a well organized school health program, and

WHEREAS, The early discovery of a hearing defect and the prompt application of corrective measures offers the greatest chance for the effective prevention and amelioration of deafness,

THEREFORE, BE IT RESOLVED, by the Minnesota Academy of Ophthalmology and Oto-Laryngology that it favors the enactment by the 1937 legislature of the State of Minnesota of laws effectively providing for the periodic testing of the hearing of all school children by modern methods sufficiently accurate to disclose a significant hearing loss.

BOOK REVIEW.

A Study of Some Personality Aspects of Deaf Children. By Lily Brunswig, Ph.D. Teachers College Contributions to Education, No. 687. Published with the approval of Prof. Rudolph Pintner, Sponsor. 143 pages with bibliography. New York: Bureau of Publications, Teachers College, Columbia University. 1936.

By means of group tests, personality aspects of deaf children were studied in comparison to those of hearing children and in relation to chronological age, intelligence, amount of hearing, and age of hearing loss.

The Rogers Test of Personality Adjustment was given to 159 deaf pupils of three residential schools. The average chronological age was 15 years and the average intelligence quotient, as measured by the Pintner Non-Language test, was 106 for the boys and 100 for the girls. From public schools, 243 hearing children with an average age of 13 years were tested. The deaf boys were more maladjusted in social maladjustment and day-dreaming, the latter being a statistically reliable difference. The deaf girls were less maladjusted than the hearing in all but family maladjustment. Correlations with the amount of hearing, age of onset of deafness and years in school were low.

Realizing the need for a personality inventory for deaf children, Dr. Brunswig constructed and standardized a test of items measuring social, school, home and general adjustments. It was administered in final form to 183 deaf, 346 hearing, and a supplementary group of 1200 deaf children. The deaf showed poorer adjustments throughout this test.

The item analysis shows that the deaf report feelings of difference from other children. They prefer deaf companions, although 90 per cent play with hearing children. There are no clear cut differences in home and family adjustments. More deaf rate themselves as superior to other children. This "vanity" is probably due to compensation for inferiority or because they receive more attention due to their handicap. Both hearing and deaf select more frequently the wishes to have their parents love them more and to be smarter. Wishes to talk better or hear better are ranked from fifth to eighth.

The Personality Inventory for Deaf Children, constructed by Dr. Brunswig, should be of value in surveys of pupil adjustment and in diagnosis of individual maladjustments for purposes of guidance. H. S. L.

